RECORD OF DECISION

Mercury Refining Site

Towns of Colonie and Guilderland, Albany County, New York

United States Environmental Protection Agency
Region II
New York, New York

September 2008

DECLARATION FOR THE RECORD OF DECISION

Site Name and Location

Mercury Refining Site
Towns of Colonie and Guilderland, Albany County, New York

Superfund Identification Number: NY00048148175

Statement of Basis and Purpose

This Record of Decision (ROD) documents the U.S. Environmental Protection Agency's (EPA's) selection of a remedy for the Mercury Refining Site (Site), which is chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §§9601-9675, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300. This decision document explains the factual and legal basis for selecting the remedy for the Site.

The information supporting this remedial action decision is contained in the Administrative Record. The index for the Administrative Record is attached to this document (Appendix III).

The State of New York concurs with the selected remedy.

Assessment of the Site

Actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of Selected Remedy for Soils and Groundwater - Cap Maintenance, Groundwater Monitoring, In-Situ Solidification/Stabilization, Limited Soil Excavation and Institutional Controls, and for Sediments - Removal and Disposal

The response action described in this document represents the only planned remedy for the Mercury Refining Site. It addresses mercury contamination in the soils, groundwater and sediments.

The major components of the selected remedy include the following:

- Excavation and off-Site disposal of surface soils and subsurface soils above the water table from the Mercury Refining Property and adjoining properties (*i.e.*, Albany Pallet and Box Company (Albany Pallet), Allied Building Products Corporation (Allied Building) and

Diamond W. Products Incorporated (Diamond W.) which exceed the cleanup level for mercury in soil of 5.7 parts per million (ppm) for industrial property usage. These soils also include the soils associated with the stormwater sewer/catch basin systems. Verification sampling will be performed to confirm the effectiveness of the remedy. Clean soil will be backfilled into the excavated areas.

- Solidification/Stabilization involving mixing or injection of treatment agents at the Mercury Refining and Allied Building properties to immobilize contaminants in surface soils, subsurface soils,[1] and soils below the water table where the groundwater has a dissolved mercury concentration which exceeds the cleanup level of 0.7 parts per billion (ppb) for mercury in groundwater. Pilot testing will be performed before treatment and verification sampling will be performed after treatment to confirm the effectiveness of the remedy in immobilizing contaminated soils and achieving groundwater standards.

- Imposition of institutional controls in the form of environmental easements/restrictive covenants to restrict future development/use of the Site. Specifically, environmental easements/restrictive covenants will be filed in the property records of Albany County. The easements/covenants will at a minimum: (a) limit the Site to industrial uses; (b) preserve the integrity of the existing clay cap on the southern portion of the Mercury Refining Property; (c) preserve the integrity of the solidified/stabilized mass; (d) prevent the excavation of soils which lay beneath the Phase 1 Building, which housed Mercury Refining's operations, and the Container Storage Building, which was used to store incoming mercury bearing material for processing, unless the excavation follows a Site Management Plan (see below); and (e) restrict the use of groundwater as a source of potable or process water until groundwater quality standards are met.

- Development and implementation of an EPA-approved Site Management Plan (SMP). The SMP, will, among other things, address long-term operation and maintenance (O&M) of the Site, and future excavation of soils, including, but not limited to, soils beneath the Phase 1 and Container Buildings on the Mercury Refining Property, and soils on the Albany Pallet Property, the Allied Building Property, and the Diamond W. Property, which will not be remediated by this remedy, to insure that the soils are properly tested and handled to protect the health and safety of workers and the nearby community. The approved SMP will also require an evaluation of the potential for vapor intrusion at all existing buildings on-Site and/or those to be constructed in the future, and mitigation, if necessary, in compliance with the SMP. Finally, the SMP will provide for the proper management of all Site remedy components post-construction and shall include: (a) monitoring of groundwater to ensure that, following Site remediation, the contamination has attenuated and the groundwater has been remediated; (b) monitoring and maintenance of institutional controls; (c) a provision for operation and maintenance of the clay cap; (d) periodic certifications by the owners/operators of the Site properties or other party implementing the remedy that the institutional and engineering

[1] This would include soils beneath the existing asphalt/concrete cap but not soils beneath the Container Storage Building or the existing clay cap.

controls are in place; and (e) a provision to manage the demolition or alteration of the existing buildings on-Site, if such demolition or alteration is required in the future, to protect the health and safety of the workers and the nearby community and to ensure proper disposal of any building debris.

- Removal, dewatering and disposal of the mercury-contaminated sediments in the Unnamed Tributary exceeding the cleanup level for mercury in sediments of 1.3 ppm.

- Verification sampling will be performed to confirm the effectiveness of the remedy.

- Sampling of the fish, surface water and sediments in the Patroon Creek, the Unnamed Tributary and the I-90 Pond to assess impacts on the biota on an annual basis for five years. Sampling thereafter will be based on the results of the five annual sampling rounds, as reported within the first five-year review. Should conditions change with regard to the I-90 Pond dam (i.e., the dam is repaired, removed, or if it should fail), EPA will evaluate the potential impact of any significant releases and, if necessary, take or require response actions to mitigate their potential impact.

- In accordance with CERCLA and because the remedy will result in contaminants remaining on-Site above levels that will allow for unlimited use and unrestricted exposure, the Site remedy will be reviewed at least once every five years.

Statutory Determinations

The selected remedy meets the requirements for remedial actions set forth in CERCLA §121. It is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. In keeping with the statutory preference for treatment that reduces toxicity, mobility or volume of contaminated media, the heavily contaminated soils below the water table, defined as principle threat wastes, will be treated.

The selected remedy satisfies the statutory preference for permanent solutions. The use of treatment through solidification in one area and the removal of a portion of the contaminated soils above the groundwater and other soils which are associated with the stormwater sewer/catch basin systems will eliminate exposure pathways while not interfering with future development of the Site for industrial use. The remedy will be protective of the groundwater through the removal of mercury contaminated soils above the water table and treatment of contaminated deeper soils and groundwater, and through institutional controls and long-term groundwater monitoring. The remedy will also be protective of ecological receptors through the removal of contaminated sediments at the stormwater outfall. The SMP will ensure that all parts of the remedy remain protective of human health and the environment.

In accordance with CERCLA and because the remedy will result in contaminants remaining on-Site above levels that will allow for unlimited use and unrestricted exposure, the Site remedy will be reviewed at least once every five years.

ROD DATA CERTIFICATION CHECKLIST

The ROD contains the remedy selection information noted below. More details may be found in the Administrative Record file for this Site.

- The chemical of concern for the Site is mercury (see pages 17 through 23 of the ROD);
- Baseline risk represented by the chemicals of concern (see ROD pages 17 through 25 and TABLES 1 through 6, 8 and 9);
- Current and reasonably anticipated future land use assumptions used in the baseline risk assessment and ROD (see ROD page 16);
- Cleanup levels established for chemicals of concern and the basis for these levels (see ROD pages 25 and 26);
- Estimated capital, annual operation and maintenance, and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (see ROD pages 41 through 43, and TABLES 10 and 11); and
- Key factor(s) that led to selecting the remedy (*i.e.*, how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision)(see ROD pages 43 and 44).

_____ _____

George Pavlou, Acting Director Date
Emergency & Remedial Response Division
EPA - Region II

ROD FACT SHEET

SITE

Site name: Mercury Refining Superfund Site
Site location: Towns of Colonie and Guilderland, Albany County, New York

EPA Region: 2
HRS score: 44.58
EPA Site ID No: NY00048148175

ROD

Date signed:
Operable unit: 1
Selected Remedy: Cap Maintenance, Groundwater Monitoring, In-Situ Solidification/Stabilization, Limited Soil Excavation and Institutional Controls for Soil and Groundwater and Removal and Disposal of Contaminated Sediments

Capital cost: $9.6 million
Annual O & M cost: $1.4 million
Present-worth cost: $11,080,000

LEAD

United States Environmental Protection Agency

Primary Contact: Thomas Taccone, Remedial Project Manager, (212) 637-4281
Secondary contact: Kevin Lynch, Chief, Western New York Remediation Section, (212) 637-4287

WASTE

Waste Type: Soils, Groundwater and Sediments Contaminated with Mercury

Waste Origin: Mercury Reclamation Operations Conducted by the Mercury Refining Company, Inc.

Contaminated Media: Soils, Groundwater and Sediments

DECISION SUMMARY

Mercury Refining Site

Towns of Colonie and Guilderland, Albany County, New York

United States Environmental Protection Agency
Region II
New York, New York

September 2008

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SITE NAME, LOCATION AND DESCRIPTION

The Site includes the Mercury Refining Company, Inc. (MERECO) Property, which is located at 26 Railroad Avenue on the border of the Towns of Guilderland and Colonie, Albany County, New York (MERECO Property). This approximately 0.68-acre lot was used as a mercury reclamation facility. Figure 1 (see Appendix I) shows the MERECO Property location. The areas to the north, east, and west of the MERECO Property are principally light industrial with some commercial use and warehousing. The Albany Pallet and Box Company (Albany Pallet) lies to the north of the Property, Allied Building Products Corporation (Allied Building) is located east of the Property and Diamond W Products Incorporated (Diamond W) is located west of the MERECO Property. A CSX Railroad right-of-way is located south of the Property. The closest residence is located approximately one-quarter mile north of the Site.

The Site is defined by the extent of contamination associated with MERECO's past reclamation processes and includes the MERECO Property, the western portion of the Allied Building Property, the southern portion of Diamond W, the southern portion of the Albany Pallet Property, and a portion of an unnamed tributary to Patroon Creek (the Unnamed Tributary), which is located immediately south of the MERECO Property.

The Unnamed Tributary received and continues to receive, contaminated stormwater drainage from the southern edge of the MERECO Property. Approximately 1,600 feet downstream of the MERECO Property, the tributary converges with Patroon Creek. Approximately one mile downstream of the MERECO Property there is a dam in the Creek which forms the I-90 Pond. The Creek flows over the dam's spillway and enters the Hudson River approximately 5 miles from the stormwater outfall. The dam is owned and maintained by the City of Albany, New York.

The northeastern portion of the MERECO Property is currently covered by a concrete and asphalt cap which is a single-layer cap. The cap was installed to reduce the infiltration of rain water and to prevent direct contact with underlying soils which are contaminated with mercury. The southern portion of the Property is covered by a single-layer clay cap which was installed after the excavation and off-Site disposal of mercury and polychlorinated biphenyl (PCB)-contaminated soils in 1985. The Property currently includes two buildings and is surrounded by a chain link fence. One of the buildings, called the Phase 1 Building, houses the past and current operation of MERECO. The other building, called the Container Storage Building, has been used to store incoming material for processing in the Phase 1 Building. A commercial asphalt roadway and a wide business driveway provide access to the MERECO Property.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

Site History

MERECO was founded in 1955. The facility used retorts (specialized ovens to distill and recover

mercury) to reclaim mercury from mercury batteries and other mercury-bearing materials, such as thermometers, fluorescent bulbs, spill debris, and dental amalgams. The recovered mercury was then refined and marketed. The retorts were contained in the old Retort Building which was located just north of the Container Storage Building (see Figure 2). MERECO also collected and brokered silver powders and small quantities of other precious metals.

Before 1980, waste contaminated with mercury was dumped over an embankment of the Unnamed Tributary. From 1980 to 1998, waste batteries and other mercury-containing materials were stored in drums on wooden pallets within paved areas of the MERECO Property prior to disposal.

The results of initial sampling performed by the New York State Department of Environmental Conservation's (NYSDEC's) Division of Fish and Wildlife in 1981 and 1982 indicated the presence of PCBs and mercury contamination in soils on the southern edge of the MERECO Property and on the embankment to the Unnamed Tributary. Results of further sampling confirmed the presence of these contaminants in soils at the MERECO Property, and mercury contamination in Creek sediments. In 1983, the Site was placed on the federal National Priorities List (NPL). At that time, the NYSDEC assumed the role of lead agency for directing and overseeing Site investigation and cleanup.

Under a September 1985 judicial Consent Decree with New York State, MERECO excavated and removed approximately 2,100 cubic yards (cy) of mercury-contaminated soils and debris, and 300 cy of PCB-contaminated soils, from contaminated areas at the MERECO Property and from the (former) Owasco River Railway Property (now CSX railroad) south of MERECO's Property line. The excavated area was backfilled with clean fill and covered with a clay cap. Contaminated soil was also found beneath the old Retort Building and, after being sealed with plastic sheeting, was left in place. A concrete cap was also poured over the portion of the MERECO Property which now serves as the floor of the Container Storage Building, which was constructed in 1989.

On June 9, 1989, MERECO entered into an Administrative Order on Consent under State law with NYSDEC. The 1989 Order called for identification and remediation of mercury-contaminated areas, both on and off of the MERECO Property, and a program to evaluate and abate migration of mercury and other contaminants from the facility, including mercury emissions from both permitted (the retorts) and fugitive air sources. As part of these evaluations, MERECO was required to conduct an investigation of Patroon Creek.

On September 14, 1989, a fire destroyed the Hand Shop building which was located on the eastern portion of the Property, and which was used for storing and housing mercury purification operations and for processing silver oxide batteries. Approximately 224 cy of charred building material and destroyed equipment debris were shipped from the Property for secure land disposal. Soil samples collected in November 1989 in the former Hand Shop building area identified hot spots of mercury contamination which were subsequently removed. The Hand Shop building was replaced in 1991 with the Phase 1 building. This building is currently used by MERECO as an office and for processing incoming material which contain precious metals.

Another fire occurred on April 10, 1991 at the Break Trailer which was located in the western portion of the MERECO Property. The fire also spread to an adjacent storage trailer. The Break Trailer had been used as a changing area/break room for employees. One-third of the trailer was also used for manual sorting and weighing of incoming mercury-containing materials to be processed.

MERECO's response to the 1989 Order was considered inadequate by NYSDEC. Another Order on Consent was signed by MERECO and NYSDEC in February 1993, under State law. The 1993 Order called for the establishment of a schedule for the completion of all activities, a permanent remedy for the abatement of emissions and migration of pollutants, quarterly groundwater monitoring for ten years, remediation/removal of contaminated soils beneath the old Retort Building and long-term monitoring of areas surrounding the Site. The 1993 Order also involved payment for civil penalties and natural resource damages.

Construction of the new retorts was completed on February 15, 1994**.** The retorts were installed in the Phase 1 Building which was fitted with reportedly state-of-the-art air pollution control equipment to control emissions from the retorts. In the fall of 1994, MERECO demolished the old Retort Building and installed an asphalt and concrete cap over the area. At this time, MERECO also dismantled a stainless steel trailer that had been located just north of the old Retort Building. In 1995, MERECO conducted a soil investigation beneath the asphalt and concrete cap. The investigation found visible free phase mercury in the soil from just below the concrete to depths of approximately 13 feet and 18 feet.

MERECO received a Hazardous Waste Corrective Action Management Permit pursuant to the Resource Conservation and Recovery Act (RCRA) from NYSDEC on December 31, 1996, for controlling the generation and storage of waste at the MERECO Property and for completing the investigation and remediation of contamination at the Property and surrounding areas. All unfinished work required by the previous consent orders were subsumed into the permit.

From 1997 through 1999, MERECO evaluated potentially suitable corrective measures for the soils beneath the old Retort Building and hired Kiber Environmental to conduct treatability studies for two potentially suitable technologies: physical treatment and in situ (in place) stabilization/solidification. In April of 1998, NYSDEC approved MERECO's work plan for implementing the treatability studies. MERECO conducted the studies in 1999.

In November 1999, after unsuccessfully working with MERECO to fully comply with the terms of its RCRA permit, NYSDEC requested that EPA take over as lead agency for the Site under CERCLA. In September 2000, EPA initiated a Remedial Investigation (RI)/Feasibility Study (FS), which, while based on data collected under NYSDEC as the lead agency, also generated additional data to complete a full characterization of the Site**.**

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Proposed Plan addressing contamination at the Site was prepared by EPA and released in March 2008. A notice of the Proposed Plan and public comment period was placed in the Albany Times

Union on March 30, 2008, consistent with the requirements of the NCP 40 CFR §300.430(f)(3)(i)(A). The public notice established a thirty-day comment period from March 30, 2008 to April 30, 2008. In response to a written request to extend the public comment period, the comment period was extended to May 30, 2008. A second notice was placed in the Albany Times Union on April 13, 2008 to announce the thirty-day extension of the comment period. The Proposed Plan and all relevant documents in the Administrative Record (see Administrative Record Index, Appendix III) were made available to the public at two information repositories, namely: the EPA Superfund Records Center at 290 Broadway, New York, New York 10007 and the William K. Sanford Town Library, 629 Albany Shaker Road, Albany, New York 12211.

EPA hosted a public meeting on April 22, 2008, at the Fuller Road Firehouse to discuss the Proposed Plan and the alternatives considered for the Site. At this meeting, representatives from EPA answered questions about the contamination at the Superfund Site and the proposed remedial alternative. EPA's responses to comments received during the public meeting, along with responses to other written comments received during the public comment period, are included in the attached Responsiveness Summary (Appendix V). Also included in Appendix V, are copies of the transcript of the public meeting as well as the comment letters.

SCOPE AND ROLE OF RESPONSE ACTION

Cleanup at the Site is currently being addressed as one operable unit (OU). This ROD describes the comprehensive long-term remediation plan for the entire Site and is expected to be the only ROD issued for the Site.

SUMMARY OF SITE CHARACTERISTICS

Site characteristics are described more completely in the RI report, which was finalized by EPA on December 4, 2003. The purpose of the RI was to define the nature and extent of contamination in on-Site surface and subsurface soils, surface water and groundwater at the MERECO Property and its adjoining properties and in the surface water and sediments of the Patroon Creek, the Creek's Unnamed Tributary and the I-90 Pond. EPA's fieldwork for the RI was conducted from September 2000 to July 2003.

To determine whether the soils, sediments, surface water, or groundwater contain contamination at levels of concern, the analytical data were compared to applicable or relevant and appropriate requirements (ARARs), or other relevant guidance if no ARARs were available.

Results of these investigations are summarized below.

Physical Site Conditions

The Mercury Refining Superfund Site lies on the west side of the Hudson Valley in the

Hudson-Mohawk River Basin, and is approximately five miles northwest of the Hudson River and the central business district of Albany. A small unnamed stream (the Unnamed Tributary) flows along the southwestern boundary of the Site and joins a channelized segment of Patroon Creek approximately 1,600 feet further to the southeast.

Geology and Hydrogeology

According to the U.S. Department of Agriculture's 1992 *Soil Survey of Albany County, New York*, the soils at the MERECO Property are classified as Urban Land. This soil classification describes nearly level to strongly sloping areas where asphalt, concrete, buildings, or other impervious materials cover more than 85 percent of the land's surface. Slopes range from 0 to 15 percent. Included in this unit are small areas of mostly miscellaneous fill. The unit has very few areas that retain the original soil characteristics for that location due to its disturbance during building activities.

The undeveloped area south of the MERECO Property, south of the railway, consists of soils classified as Udipsamments. This soil classification describes nearly level to very steep areas of disturbed sandy soils. Slopes range from 0 to 45 percent. These soils are well drained to somewhat excessively drained. These soils typically consists of about 40 percent cuts of mostly brown or yellowish-brown loamy fine sand and sand or Colonie or Elnora soils; 30 percent fills of mixed sandy material moved from the upper part of the Colonie or Elnora soils; 10 percent Urban land; and 20 percent other soils.

Site data for the MERECO Property also indicates that groundwater flows generally in a southerly direction toward the Unnamed Tributary which flows into Patroon Creek. Three rounds of groundwater measurements were collected from December 2001 to July 2003, as part of EPA's RI. The water level data showed that the hydraulic gradient doubled from the December readings to the March readings, indicating that this zone is also strongly influenced by surface runoff and precipitation.

The water level measurement data also reveal a vertical downward gradient such that the gradient could promote the downward migration of any mercury dissolved in the groundwater.

Summary of Data Collected while NYSDEC Served as Lead Agency

The following is a summary of the various investigations of the Mercury Refining Site performed under the direction of the NYSDEC between 1981 and 1999. Chemical concentrations reported below are in parts per billion (ppb) or parts per million (ppm).

In 1981, 1983, 1984, and 1985, samples were collected from sediments of the Unnamed Tributary, Patroon Creek, and the I-90 Pond and were analyzed for total mercury. In 1981, NYSDEC collected sediment samples from the bank of the Unnamed Tributary at the stormwater sewer outfall. The samples were not tested for mercury content; however visual inspection of the samples revealed globules of mercury in the samples. In 1983, mercury concentrations in the Unnamed Tributary sediments ranged from 4.7 to 8.6 ppm. In 1984 and 1985, mercury concentrations in the Unnamed Tributary, Patroon Creek, and the I-90 Pond ranged from not detected to 2.3 ppm.

Four groundwater monitoring wells were installed at the Site in 1985 and are still present. The wells were sampled quarterly by MERECO from 1991 to 2001. During this period, the concentration of mercury in the groundwater from the downgradient wells ranged from non detect to 54 ppb, which was detected in monitoring well OW-1.

The Wildlife Pathology Unit of NYSDEC conducted a major study in 1989 which included the MERECO Property, portions of the properties which border MERECO, the Unnamed Tributary, Patroon Creek, and the I-90 Pond. Sediment samples collected near the stormwater outfall, which discharges from the MERECO Property to the Unnamed Tributary, revealed mercury concentrations from 3.2 to 154 ppm. Samples collected from just south of the railroad tracks and the Allied Building Property contained mercury which ranged from 1.99 to 16 ppm. The highest mercury in the soils ranged from 275 to 497 ppm which was found to the east of the Property at and just beyond the fence line with the Allied Building Property. Soil samples collected at a greater distance from the Property perimeter were much less contaminated (*i.e.*, less than 10 ppm).

MERECO collected surface and subsurface soil samples from its Property in 1995 pursuant to the 1993 Order. Additional samples were collected in 1997 from the properties surrounding the MERECO Property, pursuant to MERECO's New York State hazardous waste corrective action permit. Visible mercury contamination was observed in soil from several sample locations which extended to a depth of at least 30 feet below the ground surface (bgs) on the MERECO Property. For the 1997 investigation, soil samples were collected from 0 to 6 inches and 6 to 12 inches bgs. Mercury concentrations were highest in samples from locations bordering the MERECO Property to the east and north. The highest mercury concentration (150 ppm) was collected at 6 to 12 inches bgs from a sample east of the old Retort Building.

In 1999, NYSDEC analyzed 59 tissue samples from fish caught along the length of Patroon Creek. Mercury was detected in all samples at concentrations ranging from 0.007 to 0.914 ppm.

Because only limited documentation on the quality of the historic data is available, EPA could not use these data as a basis for determining the risks associated with the Site. However, EPA did use the historic data as a guide for determining the number and location of samples for the RI.

EPA's Remedial Investigation Results

The field work and sampling performed by EPA during the RI characterized the nature and extent of contamination in the soils, surface water, sediments, fish tissue and groundwater at the Site. A general discussion of these findings is presented below. The RI report contains a more complete examination of the analytical results. This information is available in the Administrative Record (index attached as Appendix III).

Screening Criteria

Site-specific screening criteria were evaluated in the RI for all compounds for which samples were analyzed. The nature and extent of contamination discussion below focuses on contaminants that exceeded the Site-specific screening criteria. Generally, for each medium, the site-specific screening criteria are the most conservative value of the Federal or State value. The site-specific screening criteria utilized in this evaluation were as follows:

Soil Screening Criteria: Site-specific soil screening criteria include the following:

- EPA Region IX residential soil preliminary remediation goals (PRGs), adjusted to a cancer risk of $1x10^{-6}$ and a non-cancer hazard index of 1.0;
- NYS Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels, NYSDEC, No. 94-HWR-4046, January 24, 1994.[2]
- Site background data.

Sediments Screening Criteria: The site-specific sediments screening criteria include the following:

- Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. Ontario Ministry of the Environment, 1993; and
- New York State Guidance for Screening Contaminated Sediments Division of Fish, Wildlife and Marine Resources, January 25, 1999.

Surface Water Screening Criteria: The site-specific surface water screening criteria include the following:

- New York Ambient Water Quality Standards and Guidance Values, August 4, 1999. Source of Drinking Water (surface water); New York Ambient Water Quality Standards and Guidance Values, August 4, 1999. Human Consumption of Fish (fresh water).

Groundwater Screening Criteria: The site-specific groundwater screening criteria include the following:

- National Primary Drinking Water Standards;
- New York Ambient Water Quality Standards and Guidance Values, August 4, 1999; and
- NYS Department of Health (NYSDOH) Drinking Water Quality Standards.

2 The Remedial Investigation report used NYSDEC's TAGM document for screening the soil data. During the FS, EPA compared the RI sample data to NYSDEC's soil cleanup regulations at 6 NYCRR Part 375, which were promulgated on December 31, 2006.

Fish Screening Criteria: The site-specific screening criteria for fish consumption include the following:

- EPA Region 3 risk-based concentration for human consumption of fish.

Indicator Contaminants

Indicator contaminants were selected to focus the evaluation of the nature and extent of contamination in soil, sediments, surface water and groundwater. As a first step in the indicator contaminant selection process, analytical data collected during the RI were evaluated for frequency of detections and magnitude of exceedances of screening criteria. The Human Health Risk Assessment (HHRA) contaminants of potential concern (COPC) were reviewed to determine which contaminants contributed the most to risks and historical activities and analytical data were reviewed to determine which contaminants were related to Site operations.

- Mercury
- Methylmercury
- Arsenic
- Nickel
- Cadmium
- Chromium
- Manganese
- Polychlorinated Biphenyls
- Polyaromatic Hydrocarbons
- Thallium
- Silver

With the exception of mercury and methyl mercury, all of the COPCs were eliminated from further evaluation. EPA's reasons for eliminating them are as follows:

- Polyaromatic Hydrocarbons (PAHs) – The remedial investigation detected PAHs at concentrations which exceeded the screening criteria in background samples as well as in downstream samples. MERECO is located in an industrial area and PAHs are associated with many industrial processes including general air pollution.

- Polychlorinated Biphenyl (PCBs) - Historical records show that PCB-bearing material was brought to the MERECO Site. PCB remediation activities also occurred at the Site in the past. PCBs were detected above the screening level in the sediments of the Unnamed Tributary, the Patroon Creek and the I-90 Pond. However, PCBs were detected both upstream, in background sediments samples, as well as in downstream samples. With the exception of one sediment sample from the I-90 Pond, all PCB Aroclors were detected below 1 ppm which has been established by New York as being acceptable to ecological receptors in an industrial setting (see 6 NYCRR Part 375) . In 2001, one I-90 Pond sample indicated a concentration of 4.4 ppm of PCB Aroclor 1260. In 2004, another sample was collected at the same location, but no PCBs were detected. In addition, Aroclor 1260 was not detected above soil screening levels on-Site. This Aroclor also was not detected as part of the investigatory work performed in accordance with the September 1985 Consent Decree between MERECO and New York State which required MERECO to remove 300 cubic yards of PCB contaminated soils from the Site.

- Manganese and Arsenic - Manganese and arsenic were detected in the soils consistently within a narrow range of concentrations on-Site and off-Site. On- and off-Site concentrations of these minerals were similar. Also, neither arsenic nor manganese was found at elevated concentrations in those areas on the Mercury Refining Property which have elevated concentrations of mercury (e.g., the soils beneath the old Retort Building). Since on-Site concentrations of manganese and arsenic are consistent with background concentrations and since these minerals are naturally occurring in the soils and the aquifer, EPA believes that elevated concentrations of manganese and arsenic at monitoring well OW-3 (see Figure 3 and the discussion on groundwater sample results below) are not Site-related. While manganese is associated with past Site activity, it was not found at elevated concentrations in those areas on the Property which have elevated concentrations of mercury (i.e., the soils beneath the old Retort Building), nor was it found on-Site at concentrations which were above background.

- Chromium and Thallium - Neither of these metals are associated with past operations of MERECO. Chromium was not found to contribute to an unacceptable risk at the Site. Thallium was detected in one of three groundwater samples from monitoring well OW-3 but was not found above its soil screening level.

- Silver, Nickel and Cadmium – All three metals were components of batteries and were brought on-Site for processing. However, they were not found at elevated concentrations in areas on the Property which have elevated concentrations of mercury (e.g., the soils beneath the old Retort Building). Also, none of the metals contribute unacceptable risk at the Site.

Soil Samples

The soil investigation program consisted of surface and subsurface soil samples. Subsurface and surface samples were collected at the MERECO Property and at the adjoining properties. In addition, surface soil samples were collected from areas downwind of MERECO's retort furnaces in the prevailing wind direction (southeast). The samples were analyzed for organic and inorganic parameters.

Inorganic contaminants were widely distributed in subsurface soil samples collected on the MERECO Property. The highest detected concentrations of mercury, were observed in samples collected from four locations (MW-05D, SBD-02, SBD-03, and SBD-04), all within 100 feet of the eastern border of the Property. The highest concentration of mercury, 38,000 ppm, was detected in the sample collected approximately 10 feet below the ground in the boring located for the installation of monitoring well MW-05D (see Figure 3, Appendix I). Beads of elemental mercury were observed in samples from MW-05D down to a depth of 56 feet below ground surface (bgs). In addition to MW-05D, mercury was detected above its screening criterion at depths ranging from 4 to 18 ft bgs in samples across the Site. The mercury distribution suggests that contamination in the subsurface was likely the result of

spills or discharges in a fairly limited area.

Due to its high specific gravity, the major direction of elemental mercury migration in subsurface soils is downward. Beads of elemental mercury were also observed near the bottom of boring MW-05D, near the surface of a clay layer. The limitation of visible elemental mercury to shallower depths in soil borings located in the eastern portion of the MERECO Property suggests that it has not reached the confining layer at all locations. Although elemental mercury has a low solubility in water, elemental mercury observed in the soil boring samples will continue to be a potential source of groundwater contamination.

Because of the possibility of air deposition of mercury from the operations of MERECO, samples were collected from an area to the southeast of the MERECO facility, which is used for recreation, as evidenced by an All Terrain Vehicle (ATV) trail. During dry weather, ATVs generate significant quantities of dust, which increases the potential for human exposure and migration of contaminants via the air pathway. Mercury, manganese and arsenic exceeded their screening criterion in the off-Property surface soil samples. Mercury was detected at concentrations which ranged from 0.24 ppm to 1.3 ppm. Manganese and arsenic were detected at concentrations which were slightly above their screening criterion of 340 ppm and 2.4, respectively. Manganese was detected at 366 ppm to 442 ppm and, arsenic was detected at 2.6 ppm to 6.9 ppm. However, as indicated above, concentrations of manganese and arsenic which were detected on the ATV trail, the MERECO Property and the adjoining properties are consistent with the background concentrations and thus are naturally occurring minerals. These minerals also were not found in high concentrations in those areas of the Site which are contaminated with mercury.

The concentrations of mercury detected at the ATV trail were not high enough to contribute to air pathway risks. The mercury contamination that was detected is most likely related to wet and dry deposition of mercury emissions from historical Site operations.

Sediments Samples

In 2001, sediments samples were taken from the catch basins on the MERECO Property. Mercury was detected in all of the catch basin sediments samples. Methyl mercury was detected in three of the catch basins at concentrations ranging from 61 ppb to 263 ppb. Although the methyl mercury to total mercury ratios were low, ranging from 0.1 to 1 percent, some methylation of mercury is occurring in the sediments. Methyl mercury was widely distributed in the catch basins, indicating that the catch basins provide a suitable environment for methylation of mercury. Methyl mercury is more toxic than metallic mercury and more readily bioaccumlates and biomagnifies up the food chain. Although a number of other organic compounds exceeded sediments screening criteria, they are not believed to be associated with Site activities. The organic contaminants detected are likely derived from runoff associated with the industrial nature of the overall area and with previous applications of pesticides.

One catch basin is still used to collect runoff. Effluent from this catch basin is discharged directly to the Unnamed Tributary. Contaminated water continues to discharge from the effluent pipe connected to the inactive catch basin system into the Unnamed Tributary. Analysis of surface water samples collected from the basins detected mercury ranging from 0.75 ppb to 36.8 ppb. All the other catch basins have been closed; however, the closure method does not prevent mercury from reaching the Unnamed Tributary. Based on contaminant levels detected in the active catch basin and the discharge pipe, the catch basin system remains a pathway for mercury to enter the surface water and sediments.

Sediments samples were also collected from the Unnamed Tributary, Patroon Creek, and the I-90 Pond in 2001. Approximately one-half of the samples were co-located with surface water samples. Two samples were collected upstream of the Site in the Unnamed Tributary and Patroon Creek to provide background concentrations. Sediments samples were analyzed for full organic parameters, metals and total and methyl mercury.

Mercury was detected at 38 ppm in the surface sediments in the Unnamed Tributary which receives stormwater discharge from the MERECO Property. Mercury was also detected in the surface sediments of the I-90 Pond at 1.2 ppm. Methyl mercury was detected in all sediments grab samples. Methyl mercury concentrations ranged from 1.3 ppb to 4.78 ppb in the I-90 Pond and 0.84 ppb to 12.61 ppb at the outfall.

Additional sediments samples were collected in 2004 from the following surface water bodies: Inga's Pond, Rensselaer Lake, and the Unnamed Tributary, upstream of the MERECO Property; and the Unnamed Tributary, Patroon Creek and I-90 Pond, downstream of the MERECO Property. Figure 1 shows the location of these water bodies.

Overall, the sample results for the 2004 samples were similar to the 2001 results. However, there was a general decrease in the surficial concentration of metals in the I-90 Pond including mercury from 2001 to 2004. The surficial concentrations ranged from nondetect to 0.86 ppm. The decrease in surficial sediments concentrations could be attributable to sedimentation, stream flow, a decrease in source materials and the passage of time. The 2004 sampling indicated elevated concentrations of mercury in the I-90 Pond in sediments at depths of 2 to 3 feet. At these depths, concentrations ranged from 0.16 ppm to 2.6 ppm.

With regard to PCBs, results from the samples collected in 2004 of the Unnamed Tributary, Patroon Creek and the I-90 Pond were similar to the results obtained in 2001. Results for 2001 ranged from 0.41 ppm (Aroclor 1260) in the background (upstream) segment of the Unnamed Tributary to 4.4 ppm (Aroclor 1260) in sediments collected from the I-90 Pond. The 2004 results ranged from 0.68 ppm (Aroclor 1254) in sediments from the upstream Inga's Pond to 1.1 ppm (Aroclor 1260) in the downstream I-90 Pond. In 2004, another sample was collected next to the location from where the 2001 sample detected the PCB Aroclor 1260 at a concentration of 4.4 ppm. This 2004 sample did not detect PCBs. For the 2001 and the 2004 sampling events, 4.4 ppm of Aroclor 1260 was the highest concentration of PCBs detected. Aroclor 1260, however, was not detected in the soils at the MERECO Property above its screening level. This along with the detection of Aroclors 1260 and 1254

up and down stream of the MERECO Property, has led to EPA's conclusion that the PCBs are not a contaminant of concern for the Site.

Surface Water Samples

A total of two rounds of samples were collected from Inga's Pond and Rensselaer Lake in 2001 and in 2004, which are upstream of the MERECO Property. Both rounds also included samples from the Unnamed Tributary, Patroon Creek, and the I-90 Pond which are downstream. Figure 1 shows the location of these water bodies. The Unnamed Tributary flows from Inga's Pond. Patroon Creek flows from Rensselaer Lake which is upstream of the confluence of the Unnamed Tributary and the Creek. Samples were collected upstream of the Site to provide background data downstream of the Site. Surface water samples were analyzed for organic and inorganic parameters. The samples also were analyzed for total and methyl mercury.

Surface water samples rarely exceeded the organic or inorganic screening criteria. The maximum concentration of seventeen metals decreased in 2004 when compared to 2001. Mercury was not detected above its screening level in 2001 or 2004. Methyl mercury, which has no screening value, was detected at maximum concentrations of 0.86 ppb in 2001 and 0.094 ppb in 2004.

Groundwater Samples

In 2001, five deep monitoring wells (MW-01D, MW-02D, MW-05D, MW-06D, and MW-07D) and one shallow monitoring well (MW-07S) were installed. See Figure 3. The wells were located to determine the nature and extent of contamination in the groundwater and to monitor the groundwater quality upgradient and downgradient of the Site. Three deep wells were installed on-Site, two of which were nested with the existing wells OW-1 and OW-2, respectively. The third deep well, MW-05D, was installed in the center of the asphalt and concrete cap in the area with the greatest amount of free, elemental mercury contamination. A deep well (MW-07D) and a shallow well (MW-07S) were installed upgradient in a background location and a deep well was installed south of the Unnamed Tributary in a downgradient location (MW-06D).

Three rounds of groundwater samples were collected from four existing wells installed prior to EPA's involvement at the Site, and the six newly installed wells. All samples were analyzed for low detection levels of volatile organic compounds (VOCs), semi-VOCs, pesticides, PCBs, and inorganic chemicals.

The first two rounds collected samples from all ten wells and were conducted in 2001 and in 2002. The third round of sampling, which occurred in 2003, included sampling of monitoring well MW-05D and the four pre-existing monitoring wells. Vertical profile groundwater samples were also collected to define further the extent of groundwater contamination using direct push technology and were only analyzed for mercury.

The three rounds of groundwater monitoring well samples detected mercury in MW-05D at concentrations of 11.1 ppb, 19.8 ppb and 22.5 ppb which exceeded the New York State Water Quality Standard (NYSWQS) limit of 0.7 ppb and the federal and New York State maximum contaminant level (MCL) for drinking water of 2 ppb. All three rounds of samples were unfiltered and collected in accordance with an EPA approved quality assurance project plan. The highest total mercury concentration observed in the vertical profile samples (also unfiltered) was 901 ppb, which was located approximately 40 feet downgradient from MW-05D (see Figure 3). The profile samples collected around the perimeter of the MERECO Property indicate that the mercury contaminant plume is primarily contained within the boundaries of the MERECO Property.

Manganese was detected upgradient at concentrations which ranged from non detect to 3,470 ppb. No MCL has been established for manganese. With the exception of OW-3, downgradient concentrations ranged from non detect to 1,690 ppb of manganese. The New York water quality limit for manganese is 300 ppb. Arsenic was detected at concentrations which ranged from not detected to 19.2 ppb, exceeding the federal and New York State MCL of 10 ppb.

For the three rounds of sampling, samples collected from the already, existing monitoring well OW-3, located downgradient of MW-05D (see Figure 3, Appendix I) detected the highest concentrations of manganese (45,800 ppb), iron (60,500 ppb), sodium (65,300 ppb), thallium (37.2 ppm) and arsenic (19.2 ppb). Mercury was not detected in OW-3. Manganese and arsenic were also detected in the soils consistently within a narrow range of concentrations on-Site and off-Site. On- and off-Site concentrations of these minerals were similar. Also, neither arsenic nor manganese was found at elevated concentrations in those areas on the Property which have elevated concentrations of mercury (i.e., the soils beneath the old Retort Building). Manganese was detected in the soils at 349 ppm to 575 ppm. Arsenic was detected in the soils at concentrations which ranged from 2.6 ppm to 7.8 ppm. The upper ranges slightly exceeded the Site background concentrations for manganese and arsenic of 559 ppm and 6.9 ppm, respectively. Thallium was found in the catch basin surface water and in one of three rounds of groundwater samples from monitoring well OW-3 above its screening level. However, thallium was not found in the soil samples collected on or off-Site. Since the on-Site concentrations of manganese and arsenic are consistent with background concentrations and these minerals are naturally occurring in the soils and the aquifer, and since thallium was not detected in soil above its screening level, EPA believes that elevated concentrations of manganese, arsenic and thallium at OW-3 are not Site-related. However, this will be confirmed by additional sampling which will be conducted during the pre-design phase of the selected remedy for the Site.

Based on analytical results collected during the vertical profile event and groundwater sampling for rounds 1, 2, and 3, the lateral and vertical extent of the groundwater plume has been adequately characterized and defined. Groundwater contamination does not appear to be migrating off-Site, primarily due to the low solubility of elemental mercury in water and mercury's propensity to form complexes and sorb to aquifer materials. The distribution of contamination appears to be related to MERECO work areas, where mercury releases

occurred. A small portion of the plume is also shown to be on the adjacent Allied Building Property, to the east of MERECO.

Fish Tissue

Fish samples were collected in 2001 to support the ecological risk assessment and the human health risk assessment. Because results from the 2001 effort indicated a potential ecological impact on fish and other biota, additional fish samples were collected in 2004 as part of the baseline ecological risk assessment ("BERA"). The samples were analyzed for full organic parameters, metals and total and methyl mercury.

Pesticides detected in fish samples are not known to be Site-related and their concentrations are similar in both background and downstream samples which indicates that the Site is not a source of pesticide contamination. Regarding PCBs and Aroclor 1260, in particular, the highest concentrations detected in fish downstream and upstream of the Site were 410 ppb (I-90 Pond) and 98 ppb (Inga's Pond). The highest concentration of Aroclor 1254 found in fish caught upstream of the Site was 80 ppb; the highest level of Aroclor 1254 detected downstream of the Site in the I-90 Pond was 130 ppb. Aroclors 1254 and 1260 were commonly detected in all fish samples. In addition, Aroclor 1260 was not detected above the soil screening level for PCBs on-Site. While Aroclor 1254 was detected on Site above screening levels, it was not detected in the soil above 1 ppm, which is well below the NYSDEC's clean up objective of 25 ppm for sites which are zoned for industrial use.

As mentioned above, data collected while the NYSDEC served as lead agency indicated concentrations of mercury in fish which ranged from 7 ppb to 914 ppb within the lower reaches of Patroon Creek. The RI detected mercury in fish tissue at 110 ppb in a sample from the I-90 Pond and 220 ppb and 130 ppb in two fish caught between MERECO and the I-90 Pond. Mercury concentrations in fish collected for the BERA ranged from 48 ppb in fish collected from the background portion of the Unnamed Tributary to 175 ppb in fish from the Unnamed Tributary.

Generally, mercury found in fish tissue is in the form of methyl mercury, which is available for biomagnification in the food chain. Biomagnification is the process whereby small concentrations of contaminants, such as mercury, increase through the consumption of bioaccumulated chemicals contained in smaller prey. Fish tissue were sampled and analyzed to evaluate the potential for ecological and human health effects.

Fate and Transport

As part of its studies, EPA evaluated the fate and transport of indicator contaminants at the Site. Mercury is relatively insoluble in water and shows a high tendency to adsorb to soil or organic matter in soil, or be suspended in aqueous media. However, the data shows mercury contamination on-Site in those areas where MERECO conducted its mercury reclamation operations and upgradient and downgradient of the Site as far as the most downgradient sampling location (SD-14).

Of the major metal contaminants found at the Site in various media, only arsenic, lead, manganese, thallium, and mercury were detected in the groundwater samples. The low ratio of mercury dissolved in groundwater to mercury in Site soils is consistent with the expected fate of mercury, in which, instead of dissolving into groundwater, mercury adheres or accumulates within Site soils, sediments, and biota in nearby streams, tributaries, and the I-90 Pond. However, soils within the Property appear to have moved off the Property, contaminating the sediments of the streams and soils in the vicinity of MERECO, via stormwater flow in the catch basins. MW-05D shows high mercury levels in groundwater whereas, in the adjacent boring, SBD-04, mercury levels drop off, indicating that the contaminant is (within subsurface soils) restricted to the vicinity of monitoring well MW-05. This was confirmed by a third round of groundwater data which was collected in July 2003. Analysis of that data confirmed that the contaminant plume of mercury is relatively stable over the sampling timeframe and does not appear to be migrating off the MERECO Property.

EPA also performed an analysis of the potential for the erosion of the uncontaminated surface layer and resuspension of the deeper, contaminated sediments in the I-90 Pond, during flood events such as a 100-year storm. The analysis indicated that sediments are unlikely to become resuspended during a major storm event, using the critical water velocity and shear stresses which would be induced by such a storm. Also, the top two feet of sediments in the I-90 Pond are relatively uncontaminated. This buildup of sediments in the pond supports the fact that the pond is a depositional environment, so that the possibility for contaminated sediments migrating down stream of the pond is remote.

CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The Site is currently zoned for industrial use, including commercial and industrial uses. Based on discussions with officials in the Towns of Guilderland and Colonie, New York, the anticipated use for the Site is industrial. EPA's remedy will be consistent with the Towns anticipated future use of the Site.

Ecology

Threatened, Endangered Species and Sensitive Environments

An ecological characterization of the Site was conducted in May 2002, characterizing the Site's terrestrial and aquatic communities in terms of vegetative composition, wildlife habitat, and observed/expected wildlife usage. Additionally, potential wetlands associated with the Site were evaluated by reviewing state and federal wetland mapping, soil type information, and flood plain information, and supplemented with field observations.

The federally-listed endangered species, the Karner blue butterfly (*Lycaeides melissa samuelis*) has been reported by the United States Fish and Wildlife Service (USFWS) to be located within the area of the Site. The habitat necessary to support this species was not observed. The NYSDEC State-listed rare, threatened, and endangered species were

reviewed and no threatened or endangered species were observed on Site.

No Federal- or State-mapped wetland areas are associated with the Site. However, some localized wetlands may exist along the fringe of the Unnamed Tributary. A wetlands delineation will be performed during the remedial design to confirm the extent of the wetlands area and any affected wetlands to the Unnamed Tributary will be restored. Terrestrial communities at the Site are described in terms compatible with the ecological communities described in *Ecological Communities of New York State* (New York Heritage Program 2002) and include: industrial, successional old field, and successional hardwoods. The aquatic habitats associated with the Site were evaluated. The primary species expected to utilize the Unnamed Tributary, Patroon Creek, and the I-90 Pond either as a habitat or as a food source are the frog, turtle, small fish, aquatic invertebrates, raccoon, mink, and muskrat.

SUMMARY OF SITE RISKS

As part of the RI/FS, EPA conducted a baseline risk assessment to estimate the current and future effects of contaminants on human health and the environment. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases, under current and future land, groundwater, surface water, and sediment uses. The baseline risk assessment includes a human health risk assessment and an ecological risk assessment. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the baseline risk assessment for the Site.

Human Health Risk Assessment

A four-step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario: *Hazard Identification* – uses the analytical data collected to identify the contaminants of potential concern at the site for each medium, with consideration of a number of factors explained below; *Exposure Assessment* - estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (e.g., ingesting contaminated well-water) by which humans are potentially exposed; *Toxicity Assessment* - determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response); and *Risk Characterization* - summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks. The risk characterization also identifies contamination with concentrations which exceed acceptable levels, defined by the National Contingency Plan (NCP) as an excess lifetime cancer risk greater than $1 \times 10^{-6} - 1 \times 10^{-4}$ or a Hazard Index greater than 1.0; contaminants at these concentrations are considered chemicals of concern (COCs) and are typically those that will require remediation at the site. Also included in this section is a discussion of the uncertainties associated with these risks.

Hazard Identification

In this step, the chemicals of potential concern (COPCs) in each medium were identified based on such factors as toxicity, frequency of occurrence, fate and transport of the contaminants in the environment, concentrations, mobility, persistence, and bioaccumulation. Analytical information that was collected to determine the nature and extent of contamination revealed the presence of mercury and methyl mercury in soils, groundwater, and sediments at the Site at concentrations of potential concern. Based on this information, the risk assessment focused on surface soils, subsurface soils, groundwater and sediments, and contaminants which may pose significant risk to human health.

Mercury and methyl mercury were identified as the COCs at the Site in sediments, groundwater, and surface and subsurface soils. A comprehensive list of all COPCs can be found in the baseline human health risk assessment (BHHRA) in the administrative record. Mercury and methyl mercury are the only chemicals which require remediation at the Site.

Exposure Assessment

Consistent with Superfund policy and guidance, the BHHRA is a baseline human health risk assessment and therefore assumes no remediation or institutional controls to mitigate or remove hazardous substance releases. Cancer risks and noncancer hazard indices were calculated based on an estimate of the reasonable maximum exposure (RME) expected to occur under current and future conditions at the Site. The RME is defined as the highest exposure that is reasonably expected to occur at a site. For those contaminants for which the risk or hazard exceeded the acceptable levels, the central tendency estimate (CTE), or the average exposure, was also evaluated.

The Site is currently zoned for commercial/industrial use. According to the historical and current land use and the surrounding Property use, as well as discussions with the Towns of Guilderland and Colonie, it is expected that the future land use for this area will remain consistent with current industrial use. The BHHRA evaluated potential risks to populations associated with both current and potential future land uses.

Although the groundwater is not currently used for drinking, it is designated by the State as a potable water supply, meaning it could be used in the future as a drinking water source and thus needs to be evaluated as such.

Contaminants in surface water did not exceed their conservative health-based screening values and were therefore not quantitatively evaluated.

Exposure pathways were identified for each potentially exposed population and each potential exposure scenario for the groundwater, soils, and sediments. For soils, the exposure pathways evaluated included incidental ingestion of soils by Site workers and construction workers. Groundwater was evaluated as a future potable water supply for residential populations. Therefore, exposure pathways assessed in the BHHRA for the groundwater include future ingestion of groundwater by residents and inhalation of volatiles in

groundwater by residents while showering. Potentially exposed populations associated with sediments included recreational users of Patroon Creek and the Unnamed Tributary. A list of all exposure pathways can be found in Appendix II, Table 1.

Ecological risk was assessed for wildlife which use Patroon Creek and the Unnamed Tributary, including the Belted Kingfisher.

Typically, exposures are evaluated using a statistical estimate of the exposure point concentration, which is usually an upperbound estimate of the average concentration for each contaminant, but in some cases may be the maximum detected concentration. A summary of the exposure point concentrations for the COCs in each medium can be found in Appendix II, Table 2, while a comprehensive list of the exposure point concentrations for all COPCs can be found in the BHHRA.

Toxicity Assessment

Under current EPA guidelines, the likelihood of carcinogenic risks and noncancer hazards due to exposure to Site chemicals are considered separately. Consistent with current EPA policy, it was assumed that the toxic effects of the Site-related chemicals would be additive. Thus, cancer and noncancer risks associated with exposures to individual COPCs were summed to indicate the potential risks and hazards associated with mixtures of potential carcinogens and noncarcinogens, respectively.

Toxicity data for the human health risk assessment were provided by the Integrated Risk Information System (IRIS) database, the Provisional Peer Reviewed Toxicity Database (PPRTV), or another source that is identified as an appropriate reference for toxicity values consistent with EPA's directive on toxicity values. This information is presented in Appendix II, Table 3 (noncancer toxicity data summary) and Appendix II, Table 4 (cancer toxicity data summary). Because mercury is not a carcinogen, carcinogenic toxicity values are not available for mercury; therefore, mercury is not quantitatively evaluated for carcinogenic health effects in the BHHRA (see Table 4, Appendix II).

Risk Characterization

Noncarcinogenic risks were assessed using a hazard index (HI) approach, based on a comparison of expected contaminant intakes and benchmark comparison levels of intake (reference doses, reference concentrations). Reference doses (RfDs) and reference concentrations (RfCs) are estimates of daily exposure levels for humans (including sensitive individuals) which are thought to be safe over a lifetime of exposure. The estimated intake of chemicals identified in environmental media (*e.g.*, the amount of a chemical ingested from contaminated drinking water) is compared to the RfD or the RfC to derive the hazard quotient (HQ) for the contaminant in the particular medium. The HI is obtained by adding the hazard quotients for all compounds within a particular medium that impacts a particular receptor population.

The HQ for oral and dermal exposures is calculated as below. The HQ for inhalation exposures is calculated using a similar model that incorporates the RfC, rather than the RfD.

HQ = Intake/RfD

Where: HQ = hazard quotient
Intake = estimated intake for a chemical (mg/kg-day)
RfD = reference dose (mg/kg-day)

The intake and the RfD will represent the same exposure period (i.e., chronic, subchronic, or acute).

As previously stated, the HI is calculated by summing the HQs for all chemicals for likely exposure scenarios for a specific population. An HI greater than 1.0 indicates that the potential exists for noncarcinogenic health effects to occur as a result of site-related exposures, with the potential for health effects increasing as the HI increases. When the HI calculated for all chemicals for a specific population exceeds 1.0, separate HI values are then calculated for those chemicals which are known to act on the same target organ. These discrete HI values are then compared to the acceptable limit of 1.0 to evaluate the potential for noncancer health effects on a specific target organ. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a carcinogen, using the cancer slope factor (SF) for oral and dermal exposures and the inhalation unit risk (IUR) for inhalation exposures. Excess lifetime cancer risk for oral and dermal exposures is calculated from the following equation, while the equation for inhalation exposures uses the IUR, rather than the SF:

Risk = LADD x SF

Where: Risk = a unitless probability (1×10^{-6}) of an individual developing cancer
LADD = lifetime average daily dose averaged over 70 years (mg/kg-day)
SF = cancer slope factor, expressed as [1/(mg/kg-day)]

These risks are probabilities that are usually expressed in scientific notation (such as 1×10^{-4}). An excess lifetime cancer risk of 1×10^{-4} indicates that one additional incidence of cancer may occur in a population of 10,000 people who are exposed under the conditions identified in the assessment. Again, as stated in the NCP, the acceptable risk range for Site-related exposure is 10^{-6} to 10^{-4} with the goal of protection being 10^{-6}.

As set forth in Tables 5 (noncancer health effects) and 6 (cancer health effects) the risks and hazards associated with the Site are:

Recreational Users of Patroon Creek, the Unnamed Tributary of the Creek and the I-90 Pond: Risks and hazards were evaluated for recreational consumption of fish caught from these surface water bodies. HI values and excess lifetime cancer risks associated with fish consumptions were within acceptable levels.

Current and Future Site Workers: Risks and hazards were evaluated for Site workers exposed to inhalation of mercury vapors in indoor air. The calculated HI is 40. Excess lifetime cancer risks are within acceptable levels for Site-related contaminants. However, EPA's selected remedy for this Site cannot address this exposure pathway since the release of mercury vapor has and is occurring solely within an active workplace, and indoor sources are likely contributing significantly to the indoor air concentrations. The release of hazardous substances, such as mercury, occurring within an active facility, such as Mercury Refining, is not a release under CERCLA. Therefore, the indoor inhalation exposure pathway cannot be addressed by using CERCLA authority.

Future Construction Workers: Risks and hazards were evaluated for incidental ingestion of, dermal contact with, and inhalation of particulates released from surface and subsurface soils. The HI is 70 for construction workers; mercury is the most significant contributor to the total hazard. Excess lifetime cancer risks are within acceptable levels for Site-related contaminants.

Future Groundwater Use: Risks and hazards were evaluated for ingestion of and dermal contact with tap water using a residential exposure scenario. The HI is 30 for the adult resident and 250 for the child resident; for both the adult and the child, mercury is the most significant contributor to the total hazard. Excess lifetime cancer risks are within acceptable levels for Site-related contaminants. In addition, the maximum detected concentration of mercury in groundwater (22.5 ug/L) also exceeds the New York State Water Quality Standard (NYSWQS) limit of 0.7 ug/L and the federal and New York State maximum contaminant level (MCL) for drinking water of 2 ug/L.

Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- environmental chemistry sampling and analysis
- environmental parameter measurement
- fate and transport modeling
- exposure parameter estimation
- toxicological data.

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the

actual levels present. Environmental chemistry-analysis error can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the chemicals of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the chemicals of concern at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the risk assessment provides upper-bound estimates of the risks to populations near the Site, and is highly unlikely to underestimate actual risks related to the Site.

More specific information concerning public health risks, including a quantitative evaluation of the degree of risk associated with various exposure pathways is presented in the risk assessment report.

These noncancer health hazards indicate that there is significant potential risk from direct exposure to soils and groundwater to potentially exposed populations. For these receptors, exposure to mercury in soils and groundwater results in an HI above the threshold of 1. The concentration of mercury is also in excess of both the NYS WQS of 0.7 ug/L and the federal and State MCL of 2 ug/L.

Ecological Risk Assessment

A Screening Level Ecological Risk Assessment (SLERA) was completed in 2003 and indicated a potential for risk to ecological receptors from exposure to chemicals detected in surface water, sediments, and soils at and in the vicinity of the Site. The SLERA used conservative assumptions to determine ecologically related COPCs and their associated risks to ecological receptors. In accordance with EPA's *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (Interim Final) (USEPA 1997), and because of the potential for ecological risk indicated by the SLERA, EPA concluded that a site-specific baseline assessment of ecological risk (BERA) was warranted.

The BERA used a multiple-lines-of-evidence approach to evaluate ecological risk, including food chain modeling, site-specific toxicity testing and tissue analysis. Risks to fish, amphibians, birds (*i.e.*, piscivorous, carnivorous, and insectivorous birds), and mammals (*i.e.*, piscivorous and insectivorous mammals) were determined through the food chain modeling. Risks posed by direct contact with sediments were assessed using the toxicity tests. Additionally, fish tissue concentrations were compared to effects-based fish tissue concentration values to indicate if mercury present in fish tissue is at concentrations which are

associated with adverse effects.

The potential exposure pathways shown on Figure 4, Appendix II, include those related to both aquatic and terrestrial environments. The process used for selection of COCs for this Site revealed elevated concentrations of mercury in sediments, but not in surface water, floodplain soils, or other environments outside of aquatic systems. The potential exposure pathways associated with terrestrial environments were therefore neither assessed in the BERA nor are they highlighted in Figure 4.

Appendix II, Table 7 shows average and maximum concentrations detected in sediments for the COCs identified and average concentrations of mercury in biological samples. Only mercury concentrations are shown for biological samples as mercury is the sediments COC with the most significant potential to bio-accumulate in and adversely affect upper trophic level receptors.

The BERA determined that mercury and other contaminants in study area sediments exhibit the potential to cause adverse effects in certain representative receptors (*e.g.*, benthic invertebrates and piscivorous birds). The sources of contamination contributing to these findings appear to include both those related to the Site (direct risks from mercury in sediments in the Unnamed Tributary, in particular in the area adjacent to the Site) and those from other, unidentified sources (*e.g.*, direct risks from PAHs are highest in Inga's Pond, upgradient of the Site).

Ecological risks associated with sediments were evaluated by the calculation of hazard quotients (HQs). An HQ of 1.0 serves as the critical threshold for risk. Calculated HQs which are greater than 1 indicate the potential for elevated risk. The HQs were calculated by dividing the maximum and mean concentrations of mercury and methyl mercury in the sediments by toxic reference values (TRV) for each contaminant. The respective TRVs for mercury and methyl mercury, of 0.18 ppm and 1.77 ppm, respectively, are threshold values above which adverse effects may be observed in fish and benthic invertebrate organisms. The derivation and selection of these values are explained further in the BERA. HQs for food chain risk were conducted to evaluate bio-accumulative effects of mercury on birds and mammals. The HQs were calculated by dividing the (maximum or mean) concentration of mercury and methyl mercury by an appropriate LOAEL (the lowest observed adverse effect level concentration) which is a receptor specific literature value.

HQs for direct contact and consumption of sediments contaminated with mercury, methyl mercury and other non-Site related contaminates are presented on Table 8, Appendix II. Potential risk (HQ greater than 1.0) was calculated at several locations for mercury (*i.e.*, Rensselaer Lake, Inga's Pond, I-90 Pond, and the Unnamed Tributary). HQs exceeded 1.0 for methyl mercury for all locations except for Rensselaer Lake where no data were available. HQs for background sampling locations collected upstream of the Site ranged from 1.7 at Rensselaer Lake to 101 for the segment of the Unnamed Tributary that is upstream of the Site, for mercury and methyl mercury. Methyl mercury is the major contributor of elevated HQ values calculated for the sediment samples collected upstream and downstream of the

Site. The highest HQ was calculated for sediments at the MERECO stormwater outfall, which contains elevated levels of mercury and methyl mercury contamination that can act as a source of contamination to ecological receptors downstream. The HQs calculated for mercury and methyl mercury at the outfall were 50 and 910, respectively.

An elevated HQ for mercury was also calculated for the sediments in the I-90 Pond. However, there is currently a two-foot layer of less contaminated sediments at the surface of the pond which, as discussed above, functions as a cap which isolates the subsurface sediments which are more contaminated. Moreover, tissue samples from fish collected from the pond did not contain mercury above 0.2 ppm which is a threshold concentration for mercury in fish. Mercury in tissue above this threshold can cause adverse effects on growth, reproduction, development and behavior.

Because the I-90 Pond is depositional and because there are no plans to maintain the pond's water depth by periodic dredging, the top layer of sediments will increase in thickness. The top six inches, which represents the biologically active zone, will become less contaminated as this layer thickens. An analysis conducted of the near-term possibility of a storm event removing this top layer determined that such an event is remote.

The analysis of risk from food chain modeling considered two exposure scenarios. Scenario 1 is based on the Site foraging factor (SFF) calculated as the ratio of the Site area to the average foraging area for the receptor of concern. Scenario 2 makes less conservative assumptions and estimates (generally higher) SFFs based on habitat suitability and availability and best professional judgment regarding receptor foraging behavior. Scenario 2 HQs are probably more realistic where prey is abundant and available, but Scenario 1 HQs represents a reasonable exposure that does not favor any particular location. The areas that were modeled include Inga's Pond (upstream of the Site), portions of the Unnamed Tributary which are upstream of the Site, the Unnamed Tributary (Adjacent to and downstream of the Site), Patroon Creek downstream from the confluence with the Unnamed Tributary, and the I-90 Pond, downstream of the Site.

As shown in Table 9, Appendix II, most of the food chain model HQs are less than 1 for most receptors. The risks from food chain exposure are expressed as a dose range: No Observable Acute Effects Level (NOAEL) to Lowest Observable Acute Effects Level (LOAEL). Doses that remain below the NOAEL suggest no risk and doses that exceed the LOAEL suggest the clearest indicator of risk. The model indicated an elevated risk (HQ of 1.4) using the LOAEL at the Unnamed Tributary for only the Kingfisher.

Based on data from the SLERA and BERA, potential ecological risks associated with mercury contaminated sediments exist. Although mercury contamination has been found in the sediments of I-90 Pond, the ecological risks in this area are considered acceptable for reasons including the background mercury concentrations upstream of the Site and the existing and continued accumulation of the top layer of sediments on the pond. However, as indicated previously, sediments near the outfall in the Unnamed Tributary was found to have the highest risk (an HQ of 910) to insects and benthic organisms through direct contact or

consumption of mercury-contaminated sediments and is the only area that poses a risk to the Kingfisher through the bioaccumulative effects of mercury through the food chain (an HQ of 1.4). Consequently, the ecological risks associated with the sediments in this area are considered unacceptable and should be addressed.

Basis for Action

Based upon the results of the RI and human health and ecological risk assessments, EPA has determined that the response action selected in this ROD is necessary to protect the public health and welfare and the environment from actual or threatened releases of hazardous substances into the environment.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are media-specific goals to protect human health and the environment. RAOs provide a general description of what a cleanup will accomplish (*e.g.*, restoration of groundwater). The RAOs are identified following the identification of COPCs, identification of potential federal and state ARARs and other guidance to be considered (TBCs), development of site-specific risk-based cleanup levels, and, finally, selection of the cleanup levels based on the ARARs, guidance values, or risk-based values. ARARs at a site may include other federal and state environmental statutes and regulations. Other federal or state advisories, criteria, or guidance are TBCs, which are not required by the NCP, but may be very useful in determining what is protective of a site or how to carry out certain actions or requirements. Cleanup levels are the more specific endpoint concentrations or risk levels for each exposure route that are believed to provide adequate protection of human health and the environment based on preliminary site information.

The RI results indicate that surface and subsurface soils and groundwater at the MERECO Property and portions of the adjoining properties are contaminated with mercury. The baseline human health risk assessment indicates that mercury poses a future health risk to Site workers through ingestion and direct contact with soil and to adults and children through ingestion of groundwater The following RAOs have been identified for the contaminated soils and groundwater:

- Prevent or minimize potential future human exposures including ingestion and dermal contact with mercury-contaminated soils in excess of 5.7 ppm, which is based on New York State's Soil Cleanup objectives at 6 NYCRR Part 375 for industrial use;

- Prevent or minimize potential ingestion of mercury-contaminated groundwater and minimize mercury contamination in soils as a source of groundwater contamination at the facility. The cleanup level will be applied to the subsurface in the aquifer where the groundwater has a dissolved mercury concentration which exceeds the NYSWQS of 0.7 ppb.

The BERA indicates that detected concentrations of mercury in sediments within the Unnamed Tributary present risks to ecological receptors. The RAO identified for sediments is:

- Remediate mercury-contaminated sediments in the Unnamed Tributary to levels that are protective of the biota such that the most significant impacts are eliminated.

The clean up level for sediments is derived from sediment screening values identified in NYSDEC's Technical Guidance for Screening Contaminated Sediment, 1994. The primary sediments cleanup level is 1.3 ppm, which is the severe effect level ("SEL"). According to this guidance, sediments which are above this concentration are likely to result in significant harm to benthic aquatic life and should be remediated. With the exception of the sediments at the MERECO stormwater outfall, where EPA found mercury in the sediments at 38 ppm, the RI did not detect mercury above a concentration of 1.2 ppm in the sediments of the Patroon Creek, the Unnamed Tributary or the biological active surface layer of sediments of the I-90 Pond. Tissue samples from fish which were caught downstream of the Site at the Unnamed Tributary had a concentration of 0.22 ppm of mercury, which slightly exceeded the tissue threshold effect concentration 0.2 ppm for fish. Tissue concentrations above this threshold may result in sub-lethal, adverse affects to fish populations. No other tissue sample from fish caught upstream or further downstream of the Site exceeded the threshold. Because the highest detected concentration of mercury in the sediments at the Site is close to the SEL with no severe effect observed in fish, EPA believes that the SEL is an appropriate cleanup level for the Site

Estimated Areas to be Remediated

Estimates were made of the quantity of contaminated soils and sediments present at the Site. These estimates were determined based on the contaminant data presented in the RI report that exceeded the cleanup levels identified above. Quantity estimates for each media are presented below.

Location	**Depth**	**Area**	**Volume of Soils**	**Volume of Sediments**
Storm Sewer	0- 10'	1,300 ft^2	480 yd^3	-
Sediments at Outfall	0-2'	1,500 ft^2	-	110 yd^3
Soils on and West of the MERECO Property	1'	36,100 ft^2	1340 yd^3	-
Soils on and East of the MERECO Property	0'-10'	7,600 ft^2	450 yd^3	-
Subsurface Soils[3]	66'	5,900 ft^2	14,400 yd^3	-
TOTAL		52,400 ft^2	16,670 yd^3	110 yd^3

[3] - The amount of subsurface soils to be treated using solidification/stabilization will depend on the volume of groundwater with a dissolved mercury concentration which exceeds the NYSDEC water quality standard of 0.7 ppb.

Location Descriptions and Assumptions:

Sediments: EPA estimates the sediments to be remediated at the stormwater outfall will include an area which is approximately 100 feet long by 15 feet wide by two feet deep. Mercury is present in the sediments here at a maximum concentration of 38 ppm. Sediments to be remediated at the stormwater outfall are shown on Figure 2 (Appendix 2).

Soils: Soils to be remediated at the eastern and western portions of the MERECO Property include the storm sewer and portions of the Diamond W., Allied Building and Albany Pallet properties which are contaminated with mercury at concentrations which exceed 5.7 ppm. Soils in these areas include Areas A, B, C and D on Figure 2. The highest mercury concentration detected in the surface soil is 150 ppm at 0-2' bgs on the Allied Building Property.

An area of subsurface soils will also have to be remediated. The area includes soils which contain groundwater with a dissolved mercury concentration of greater than 0.7 ppb. The remediation of these soils will also extend to the ground surface. This area is located on and around MERECO's processing and office building and the container storage building and includes area E on Figure 2. The highest mercury concentration in Area E is 38,800 ppm at 13' bgs. Area E also includes free-phase mercury which is visible down to 60' bgs. The water table is 10' bgs and clay is at 61' bgs.

Groundwater: Area E is defined by the area of contaminated groundwater which exceeds the NYSWQS limit of 0.7 ppb. The contaminated groundwater that is co-located with the mass of contaminated soil, while not migrating beyond this Area still presents a risk and will be addressed by the remediation of the contaminated soils. (See Principal Threat Waste section at page 37). Since mercury binds to the soil particles, traditional groundwater pump and treat remedies were not evaluated.

DESCRIPTION OF REMEDIAL ALTERNATIVES FOR SOILS AND GROUNDWATER

CERCLA requires that each selected remedy be protective of human health and the environment, be cost-effective, comply with ARARs, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

Detailed descriptions of the remedial alternatives for meeting the Site cleanup levels can be found in the FS Report. The alternatives include a no action alternative and three action alternatives. These alternatives are presented below.

The implementation time for each alternative reflects only the time required to construct or implement the remedy and not the time required to negotiate with potentially responsible parties, design the remedy, or procure contracts for design and construction.

Alternative 1 - No Action

Capital Cost:	$ 0
Annual Operation and Maintenance (O&M):	$ 0
Present Worth:	$ 69,120
Time to Implement:	0 months

Under this alternative, no further action would be implemented, and the current status of the Site would remain unchanged. This alternative would not involve reducing the toxicity, mobility, or the volume of the contaminants in the soils or the groundwater. Institutional controls would not be implemented to restrict future Site development or use.

Because this alternative would result in contaminants remaining on-Site above levels that would allow for unlimited use and unrestricted exposure, CERCLA requires that the Site be reviewed at least once every five years. The present worth estimate for this alternative includes the cost to conduct these reviews over a thirty year period.

Alternative 2 – Limited Soil Excavation, Cap Maintenance, Groundwater Monitoring and Institutional Controls

Capital Cost:	$2.9 Million
Annual Operation and Maintenance (O&M):	$96,000
Present Worth:	$4.1 Million
Time to Implement:	Less than 12 months

Alternative 2 consists of the following components:

- Inspection and, if necessary, repair of the existing concrete/asphalt and clay caps.
- Excavation of storm sewer/catch basins and surrounding soils to be disposed of off-Site.
- Excavation of surface and subsurface soils above the water table which are outside of the capped areas on-Site and which exceed the cleanup level for soil of 5.7 ppm of mercury.
- Disposal of excavated soils in accordance with applicable regulatory requirements at off-Site facilities.
- Backfill with clean soil into excavated zones.
- Implementation of institutional controls to address future development/use of the Property, to protect the concrete/asphalt and clay caps, to prohibit future demolition or alteration of the existing Site buildings unless such work is performed in accordance with the Site Management Plan (SMP)**,** and restrict groundwater use.

- Implementation of a SMP to address future development/use of the Property, long-term maintenance of the existing asphalt/ concrete and clay caps, and long-term groundwater monitoring.
- Five-year reviews.

Cap Maintenance and Repair and Soils Excavation: This alternative involves repairing the existing concrete/asphalt and clay caps on Site to reduce the amount of rain water infiltrating through the soils, thereby reducing the transport of contaminants to the groundwater. This alternative also includes excavation and off-Site disposal of surface and subsurface soils above the water table from areas A, B, C and D, as noted on Figure 2, Appendix I, which contain mercury which exceeds the cleanup level of 5.7 ppm. The soils in Areas A, B, C and D are outside of the existing caps and include soils associated with the stormwater sewer/catch basin systems. This alternative does not include excavation and disposal of contaminated material below the caps since the material extends to an approximate depth of 66 feet. Excavation of this material is not feasible given the proximity of the CSX railroad and the two buildings on the MERECO Property. The exact amount of soil to be excavated would be delineated in a pre-design investigation.

Backfill: If the backfill comes from on-Site, the excavation would be backfilled with clean fill meeting the cleanup level concentration. If the backfill comes from off-Site sources, the clean fill will meet the requirements for soil covers and backfill as set forth in 6 NYCRR Section 375-6.7. The backfilled excavation areas would be graded and compacted to allow for proper Site drainage. The existing cover layer material (vegetative or asphalt) for each area would be restored at the surface.

Institutional Controls: Institutional controls in the form of environmental easements/restrictive covenants would be implemented to restrict future development/use of the Site. Specifically, environmental easements/restrictive covenants would be filed in the property records of Albany County. The easements/covenants would at a minimum: (a) limit the Site to industrial uses; (b) preserve the integrity of the asphalt/concrete cap; (c) preserve the integrity of the clay cap; (d) prevent the excavation of soils which lay beneath the Phase 1 and Container Storage Buildings unless the excavation follows a Site Management Plan (see below) and; (e) restrict the use of groundwater as a source of potable or process water until groundwater quality standards are met**.**

Long Term Monitoring and Site Management Plan (SMP): An SMP, would, among other things, address long-term operation and maintenance (O&M) of the Site, and the future excavation of soils including soils beneath the Phase 1 and Container Buildings on the Mercury Refining Property to insure that the soils are properly tested and handled to protect the health and safety of workers and the nearby community. The approved SMP will also require an evaluation of the potential for vapor intrusion at all existing buildings on-Site and/or those to be constructed in the future, and mitigation, if necessary, in compliance with the SMP. Finally, the SMP will provide for the proper management of all Site remedy components post-construction and shall include: (a) monitoring of groundwater to ensure that, following Site remediation, the contamination is attenuating and groundwater quality

continues to improve; (b) monitoring and maintenance of institutional controls; (c) operation and maintenance of the asphalt/concrete and clay caps; (d) periodic certifications by the owners/operators of the Site properties or other party implementing the remedy that the institutional and engineering controls are in place; and (e) management of the demolition or alteration of the existing buildings on-Site, if such demolition or alteration is required in the future, to protect the health and safety of the workers and the nearby community and to ensure proper disposal of any building debris.

Five-year Reviews of the Site: Because this alternative would result in contaminants remaining on-Site above levels that would allow for unlimited use and unrestricted exposure, CERCLA requires that the Site be reviewed at least once every five years.

Alternative 3 - Cap Maintenance, Groundwater Monitoring, In-Situ Solidification/Stabilization, Limited Soil Excavation and Institutional Controls

Capital Cost:	$9.2 Million
Annual Operation and Maintenance (O&M):	$ 82,000
Present Worth:	$10.3 Million
Time to Implement:	12 months

Alternative 3 consists of the following components:

- Removal and disposal of the concrete/asphalt caps.
- Excavation of storm sewer/catch basins and surrounding soils which exceed the cleanup level for soil of 5.7 ppm and disposal off-Site in accordance with applicable regulatory requirements.
- Excavation of surface and subsurface soils above the water table which exceed the cleanup level for surface soils of 5.7 ppm of mercury.
- Disposal of excavated soils at off-Site facilities, in accordance with applicable regulatory requirements.
- Backfill with clean soil into excavated zones.
- Perform treatability testing to optimize treatment results.
- Treatment through solidification of surface and subsurface soils where the groundwater has a dissolved mercury concentration above the cleanup level of 0.7ppb.
- Post-remediation sampling to verify achievement of the cleanup level for soils and groundwater.
- Implementation of institutional controls to restrict future development/use of the Property, to protect the existing clay cap and the solidified/stabilized mass, to prohibit future demolition or alteration of the existing Site buildings unless such work is performed in accordance with the SMP and to restrict groundwater use.
- Implementation of a SMP to address future development/use of the Property, long-term maintenance of the clay cap, and long-term groundwater monitoring.
- Five year reviews.

Removal and Disposal of the Concrete and Asphalt Caps: Prior to remediation, the overlying concrete and asphalt (in Areas A through E) would be removed and disposed of off-Site. Once the concrete and asphalt layer is removed, the exposed soils would be covered by 6-mil or heavier polyethylene sheeting for dust control while work is not actively taking place at that area. In addition, portions of the chain link fence and the wooden shed would need to be demolished. The concrete, asphalt and other demolished materials is not expected to contain mercury contamination thus, for cost estimating purposes, it is assumed that these materials would be disposed of in a non-hazardous (RCRA Subtitle D) landfill. This assumption is based on the December 1994 report prepared by the Mercury Refining Company entitled, 'Furnace Building Demolition.' The report indicates that after the old furnace building was demolished, the underlying concrete slab was swept and vacuumed. However, the asphalt and concrete material to be removed will be tested to ensure proper disposal

In-Situ Solidification/Stabilization and Excavation of Soils: This alternative includes excavation and off-Site disposal of surface and subsurface soils above the water table in areas A, B, C and D and shallow soils in Area E which contain mercury and which exceed the cleanup level of 5.7 ppm (see Appendix, I, Figure 2) These soils also include the soils associated with the stormwater sewer/catch basin systems.

Additionally, this alternative includes solidification /stabilization which will be conducted in Area E (as depicted on Figure 2) on surface and subsurface soils[4] and soils below the water table where the groundwater has a dissolved mercury concentration which exceeds the NYSDEC water quality standard of 0.7 ppb. Solidification/stabilization refers to treatment processes which mix or inject binding agents into the contaminated material to immobilize and encapsulate the contaminants. This results in chemical bonding of the contaminant to reduce its solubility and soil permeability, thereby limiting contact with groundwater and stormwater. This remedy also reduces the exposed surface area, further limiting exposure to groundwater and stormwater. This reduces the contact of groundwater/stormwater with the contaminants by reducing the permeability of the soil matrix. Groundwater and soil sampling would also be performed following the remedial action to confirm that the soils and groundwater which surround the solidified mass are below the cleanup levels for soils and groundwater.

The remediation of Site soils in the plume of dissolved mercury would eliminate the source of potential future groundwater contamination because it will prevent leaching from the contaminated soil mass to the groundwater. Most of the soils in the plume are highly contaminated with mercury. Any groundwater which is not immediately treated will be restored through the natural processes of dispersion and dilution.

Treatability tests on this technology were performed under the direction of MERECO, while the NYSDEC served as the lead agency. The tests showed that the technology was able to stabilize Site soils with mercury contamination. This alternative also includes a pilot test of

4 This would include soils beneath the existing asphalt/concrete cap but not soils beneath the Container Storage Building or the existing clay cap.

this technology. The test would be performed in order to maximize the effectiveness of the technology and to support the design of its application at the Site.

Backfill: If the backfill comes from on-Site, the excavation would be backfilled with clean fill meeting the cleanup level concentration. If the backfill comes from off-Site sources, the clean fill will meet the requirements for soil covers and backfill as set forth in 6 NYCRR Section 375-6.7. The backfilled excavation areas would be graded and compacted to allow for proper Site drainage. The existing cover layer material (vegetative or asphalt) for each area would be restored at the surface.

Post-Remediation Verification Sampling: Samples of the treated soils would be collected to determine whether the cleanup levels for soils and groundwater have been met. The samples would be analyzed for Synthetic Precipitation Leaching Procedure (SPLP) and total inorganic mercury. Additional sampling may be required during the execution of the alternative.

Institutional Controls: Institutional controls in the form of environmental easements/restrictive covenants to restrict future development/use of the Site would be implemented. Specifically, environmental easements/restrictive covenants would be filed in the property records of Albany County. The easements/covenants would at a minimum: (a) limit the Site to industrial uses; (b) preserve the integrity of the clay cap; (c) preserve the integrity of the solidified/stabilized mass; (d) prevent the excavation of soils which lay beneath the Phase 1 and Container Storage Buildings unless the excavation follows a Site Management Plan (see below); and; (e) restrict the use of groundwater as a source of potable or process water until groundwater quality standards are met.

Long Term Groundwater Monitoring and Site Management Plan: Long-term operation and maintenance of the Site would be accomplished through the development and implementation of an EPA approved SMP. The SMP, would, among other things, address long-term operation and maintenance (O&M) of the Site and the future excavation of soils, including soils beneath the Phase 1 and Container Buildings on the Mercury Refining Property, which are not remediated, to insure that the soils are properly tested and handled to protect the health and safety of workers and the nearby community. The approved SMP would also require an evaluation of the potential for vapor intrusion at all existing buildings on-Site and/or those to be constructed in the future, and mitigation, if necessary, in compliance with the SMP. Finally, the SMP would provide for the proper management of all Site remedy components post-construction and shall include: (a) monitoring of groundwater to ensure that, following Site remediation, the contamination has been remediated; (b) monitoring and maintenance of institutional controls; (c) operation and maintenance of the clay cap and the solidified mass; (d) periodic certifications by the owners/operators of the Site properties or other party implementing the remedy that the institutional and engineering controls are in place; and (e) management of the demolition or alteration of the existing buildings on-Site, if such demolition or alteration is required in the future, to protect the health and safety of the workers and the nearby community and to ensure proper disposal of any building debris.

Five-year Reviews of the Site: Because this alternative would result in contaminants

remaining on-Site above levels that would allow for unlimited use and unrestricted exposure, CERCLA requires that the Site be reviewed at least once every five years.

Alternative 4 – Cap Maintenance, Groundwater Monitoring, Electrochemical Treatment, Limited Soil Excavation and Institutional Controls

Capital Cost:	$20.8 Million
Annual Operation and Maintenance (O&M):	$ 82,000
Present Worth:	$21.9 Million
Time to Implement:	36 months

Alternative 4 consists of the following components:

- Removal and disposal of the concrete/asphalt caps.
- Excavation of storm sewer/catch basins and surrounding soils which exceed the cleanup level for soils of 5.7 ppm and disposal off-Site in accordance with applicable regulatory requirements.
- Excavation of surface and subsurface soils above the water table from Areas A, B, C and D which exceed the cleanup levels for surface soils of 5.7 ppm of mercury.
- Disposal of excavated soils at off-Site facilities, in accordance with applicable regulatory requirements.
- Backfill with clean soil into excavated zones.
- Perform treatability testing to optimize treatment results.
- In-situ treatment of surface and subsurface soils and groundwater in Area E utilizing electrochemical treatment where the groundwater has a dissolved mercury concentration above the cleanup level of 0.7 ppb.
- Post remediation sampling to verify achievement of the soils and groundwater cleanup levels.
- Implementation of institutional controls to restrict future development/use of the Property, to protect the integrity of the clay cap and to restrict groundwater use.
- Implementation of an SMP to address future development/use of the Property, long-term maintenance of the existing clay cap, and long-term groundwater monitoring.
- Five-year reviews.

Removal and Disposal of the Concrete and Asphalt Caps: Prior to remediation, the overlying concrete and asphalt (for Areas A through E) would be removed and disposed of off-Site. Once the concrete and asphalt layer was removed, the exposed soils would be covered by 6-mil or heavier polyethylene sheeting for dust control while work is not actively taking place at that area. In addition, portions of the chain link fence and the wooden shed would need to be demolished. Since the concrete, asphalt and other demolished materials should not contain mercury contamination, for cost estimating purposes it is assumed they would be disposed of in a non-hazardous (RCRA Subtitle D) landfill. However, this assumption would be verified through testing prior to disposal.

Electrochemical Treatment and Excavation of Soils: This alternative would include excavation and off-Site disposal of surface and subsurface soils above the water table from areas A, B, C and D (as depicted on Figure 2, Appendix I) which contain mercury which exceeds the cleanup level of 5.7 ppm. The soils include soils associated with the stormwater and sewer/catch basin systems.

Additionally, this alternative includes electrochemical treatment which will be conducted in Area E (as depicted on Figure 2) on surface and subsurface soils[5] and soils below the water table where the groundwater has a dissolved mercury concentration which exceeds the NYSDEC water quality standard of 0.7 ppb. Electrochemical treatment involves the burying of electrodes in the soils. When the induced electrical current is passed through the soils, the soil particles become polarized. These polarized soil particles discharge electricity, causing metals to migrate towards and be deposited on the electrodes. The electrodes, with deposited mercury, would be removed at the end of the treatment process. This technology may also involve the addition of chemical amendments which may be necessary to assist in extraction and mobilization of mercury in the soils.

A laboratory scale treatability study was undertaken for EPA in 2006 by the Mississippi State University to determine whether electrochemical treatment technology could be used to remove mercury from contaminated soils and groundwater from the Site. The study used electrochemical test cells to evaluate the technology. Various chemical amendments were added to the cells to assist in extracting and mobilizing the mercury in the soils. The study showed that the addition of the chemical amendment potassium iodide resulted in a 98.5 percent reduction of mercury in the soils.

This remediation technology would eliminate the source of potential future groundwater contamination (the contaminated soils) but would also remediate the groundwater by polarizing the mercury in the groundwater causing it to migrate to the electrodes. Groundwater sampling would also be performed following the remedial action on an annual basis for the first five years. Sampling and the performance of five-year reviews thereafter would be based on the results of previous sampling rounds. This technology would be run until the concentration of mercury in the groundwater reaches 0.7 ppb or until the rate of mercury removal from the soils becomes negligible and reaches a steady state.

Backfill: If the backfill comes from on-Site, the excavation would be backfilled with clean fill meeting the cleanup level concentration. If the backfill comes from off-Site sources, the clean fill will meet the requirements for soil covers and backfill as set forth in 6 NYCRR Section 375-6.7. The backfilled excavation areas would be graded and compacted to allow for proper Site drainage. The existing cover layer material (vegetative or asphalt) for each area would be restored at the surface.

5 This would include soils beneath the existing asphalt/concrete cap but not soils beneath the Container Storage and Phase 1 Buildings or the existing clay cap.

Post-Remediation Verification Sampling: Samples of the treated soils would be collected to determine whether the cleanup levels for soils and groundwater have been met. The samples would be analyzed for Synthetic Precipitation Leaching Procedure (SPLP) and total inorganic mercury. Additional sampling may be required during the execution of the alternative.

Institutional Controls: Institutional controls in the form of environmental easements/restrictive covenants to restrict future development/use of the Site would be implemented. Specifically, environmental easements/restrictive covenants would be filed in the property records of Albany County. The easements/covenants would at a minimum: (a) limit the Site to industrial uses; (b) preserve the integrity of the clay cap; (c) prevent the excavation of soils which lay beneath the Phase 1 and Container Storage Buildings unless the excavation follows a Site Management Plan (see below) and; (d) restrict the use of groundwater as a source of potable or process water until groundwater quality standards are met.

Long Term Groundwater Monitoring and Site Management Plan: Long-term operation and maintenance of the Site would be accomplished through the development and implementation of an EPA approved SMP. The SMP, would, among other things, address long-term operation and maintenance (O&M) of the Site and the future excavation of soils beneath the Phase 1 and Container Buildings on the Mercury Refining Property which are not remediated, to insure that the soils are properly tested and handled to protect the health and safety of workers and the nearby community. The approved SMP would also require an evaluation of the potential for vapor intrusion at all existing buildings on-Site and/or those to be constructed in the future, and mitigation, if necessary, in compliance with the SMP. Finally, the SMP would provide for the proper management of all Site remedy components post-construction and shall include: (a) monitoring of groundwater to ensure that, following Site remediation, the contamination is attenuating and groundwater quality continues to improve; (b) monitoring and maintenance of institutional controls; (c) operation and maintenance of the clay cap; (d) periodic certifications by the owners/operators of the Site properties or other party implementing the remedy that the institutional and engineering controls are in place; and (e) management of the demolition or alteration of the existing buildings on-Site, if such demolition or alteration is required in the future, to protect the health and safety of the workers and the nearby community and to ensure proper disposal of any building debris.

Five-year Reviews of the Site: Because this alternative would result in contaminants remaining on-Site above levels that would allow for unlimited use and unrestricted exposure, CERCLA requires that the Site be reviewed at least once every five years.

DESCRIPTION OF REMEDIAL ALTERNATIVES FOR SEDIMENTS

Sediments Alternative 1: No Action

Capital Cost:	$0
Annual Operation and Maintenance (O&M):	$0
Present Worth:	$69,000
Time to Implement:	0 months

Under this alternative, no further action would be implemented, and the current status of the Site would remain unchanged. This alternative would not involve reducing the toxicity, mobility, or the volume of the contaminants in the sediments. Institutional controls would not be implemented to restrict future Site development or use.

Because this alternative would result in contaminants remaining on-Site above levels that would allow for unlimited use and unrestricted exposure, CERCLA requires that the Site be reviewed at least once every five years. The present worth estimate for this alternative would be the cost to conduct these reviews.

Sediments Alternative 2: Contaminated Sediments Removal and Disposal

Capital Cost:	$360,000
Annual Operation and Maintenance (O&M):	$64,000
Present Worth:	$780,000
Time to Implement:	3 months

Sediments Alternative 2 consists of the following components:

- Removal and dewatering of contaminated sediments from the Unnamed Tributary.
- Post remediation sampling to verify achievement of sediments cleanup levels.
- Sediments sampling to assess future risks to the biota.
- Five year reviews.

Sediments Removal and Disposal: This alternative would include the removal of mercury contaminated sediments from the Unnamed Tributary, dewatering of removed sediments, transportation and disposal of dewatered sediments at an off-Site landfill. Specifically, the sediments targeted for removal are located in the vicinity of the MERECO stormwater outfall wherever the sediments exceeds the cleanup level of 1.3 ppm. Verification sampling would be conducted after the removal of mercury contaminated sediments to ensure that the sediments cleanup objective of 1.3 ppm is achieved. If necessary, the dredged area would be backfilled with clean soil. In addition, excavation of the tributary sediments will result in temporary, localized disturbance to the wetlands that exist along the tributary. Affected wetlands of the Unnamed Tributary will be restored.

Sediments Monitoring: Sampling of the fish, surface water and sediments in Patroon Creek, the Unnamed Tributary and the I-90 Pond to assess Site impacts on the biota on an annual basis for five years and to determine if mercury contamination in the surface sediments stays below the cleanup level of 1.3 ppm. Sampling thereafter would be based on a review of the first five years of data. However, should conditions change with regard to the I-90 Pond dam (i.e., the dam is repaired, removed, or if it should fail) EPA will evaluate the potential impact of any significant releases and, if necessary, take or require response actions to mitigate their potential impact.

PRINCIPAL THREAT WASTES

Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 300.430 (a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for the migration of contamination to groundwater, surface water, or air, or act as a source for direct exposure. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or will present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of alternatives, using the modified remedy selection criteria which are described below. This analysis provides a basis for making a statutory finding that the modified remedy employs treatment as a principal element.

The mercury contamination at the Site in Area E is considered to be highly toxic and could present a significant risk to human health. Accordingly, the highly contaminated soils in this Area are defined as principal threat wastes. In addition to the high concentrations of mercury detected, the subsurface soils in Area E also contain beads of pure elemental mercury. Although the mass of mercury contaminated soils are immobile, the mercury contamination will not degrade or otherwise lose its high toxicity over time and will remain a source of groundwater contamination. Additionally, the aquifer is classified a 'Class GA' water body by New York State regulations at 6 NYCRR Part 701, as a potable source of drinking water. Unless addressed, Area E will remain a significant future, potential health threat to construction workers who may come into contact with the soils, and to future Site residents who may consume the groundwater.

COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting a remedy, EPA considered the factors set out in CERCLA Section 121, 42 U.S.C. §9621, by conducting a detailed analysis of the viable remedial alternatives pursuant to the NCP, 40 C.F.R. §300.430(e)(9), and OSWER Directive 9355.3-01 (*Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA: Interim Final*, October 1988). The detailed analysis consisted of an assessment of the individual alternatives against each of nine evaluation criteria and a comparative analysis focusing upon the relative performance of each alternative against those criteria.

The following "threshold" criteria are the most important and must be satisfied by any alternative in order to be eligible for selection:

1. *Overall protection of human health and the environment* addresses whether or not a remedy provides adequate protection and describes how risks posed through each

exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. *Compliance with ARARs* addresses whether or not a remedy would meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and regulations or provide grounds for invoking a waiver. Other federal or state advisories, criteria, or guidance are TBCs. TBCs are not required by the NCP, but the NCP recognizes that they may be very useful in determining what is protective of a site or how to carry out certain actions or requirements.

The following "primary balancing" criteria are used to make comparisons and to identify the major tradeoffs between alternatives:

3. *Long-Term effectiveness and permanence* refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

4. *Reduction of toxicity, mobility, or volume through treatment* is the anticipated performance of the treatment technologies, with respect to these parameters, a remedy may employ.

5. *Short-term effectiveness* addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup levels are achieved.

6. *Implementability* is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. *Cost* includes estimated capital, O&M, and present worth costs.

The following "modifying" criteria are used in the final evaluation of the remedial alternatives after the formal comment period, and may prompt modification of the preferred remedy that was presented in the Proposed Plan:

8. *State acceptance* indicates whether, based on its review of the RI/FS report, Human Health and Ecological Risk Assessment, and Proposed Plan, the State concurs with, opposes, or has no comments on the selected remedy.

9. *Community acceptance* refers to the public's general response to the alternatives described in the RI/FS report, Human Health and Ecological Risk Assessment, and Proposed Plan.

A comparative analysis of these alternatives for the soil and groundwater, based upon the evaluation criteria noted above, follows.

Overall Protection of Human Health and the Environment

Alternative S1 would not be protective of human health and the environment since soils and groundwater exceeding the remediation cleanup levels would remain in place. Alternative S2 would provide protection to human health through capping and institutional controls, however it would not be fully protective because most of the mercury contaminated soils and free-phase mercury would remain in the subsurface soils where they have the potential to contribute to contamination in the groundwater that would not be addressed and pose a risk to future on-Site construction workers. Alternative S2 would provide some protection since contaminated surface soils would be disposed of off-Site. Alternatives S3 and S4 would be protective of human health and the environment since contaminated groundwater, which is considered potable by New York State, as well as surface and subsurface soils would be either remediated or removed from the Site.

Compliance with ARARs

EPA has identified New York State's soil cleanup objective of 5.7 ppm for mercury for an industrial facility as an ARAR, TBC or other guidance to address contaminated surface and subsurface soils above the water table at the Site. The NYSWQS are chemical-specific ARARs for the groundwater and are being used to address soils below the water table. Alternatives S1 and S2 would not meet the ARARs for groundwater since the groundwater which exceeds the cleanup criteria would remain in place and no measures would be implemented to reduce or eliminate the dissolution of mercury into the groundwater. Alternatives S3 and S4 could meet the ARARs for groundwater, since the contaminated subsurface soils and groundwater would be treated. All location- and action-specific ARARs would be achieved under Alternatives S2, S3 and S4.

Long-Term Effectiveness and Permanence

Alternative S1 would not be effective or permanent since no remedial action would be implemented. Alternative S2 would be more effective and permanent than Alternative S1, but less than Alternatives S3 and S4, since untreated principle threat waste would remain on-Site. Alternative S3 would be permanent since it would remove and dispose of surface and subsurface soils off-Site and would treat contaminated subsurface soils in Area E, which contains the Site's principle threat waste, using solidification/stabilization. Under Alternative S4, mercury contamination in the surface and subsurface soils above the water table would be removed and sent off-Site. The surface and subsurface soils and the groundwater in Area E would be permanently removed through electrochemical treatment, including the principle threat wastes in Area E.

Regarding Alternative S3, two solidification/stabilization treatability studies have been performed on Site soils and both studies were able to treat the soils to below the RCRA TCLP[6] limit of 0.2 ppm. Another treatability study would be required optimize application of the technology. The use of electrochemical treatment in Alternative S4 would be permanent but its effectiveness would need to be determined by a treatability test on-Site. The effectiveness of electrokinetics has not been fully demonstrated, although a bench-scale study demonstrated that the technology could potentially attain the cleanup levels under laboratory conditions. An on-Site treatability test would be required to confirm the effectiveness and to obtain design parameters for this technology.

Reduction in Toxicity, Mobility or Volume (TMV) through Treatment

Since Alternative S1 does not include treatment or excavation, it would not reduce the TMV of contaminated soils through treatment. Alternative S2 would not reduce the TMV of the contaminated subsurface soils through treatment because capping is not considered a treatment technology. S2, S3 and S4 would reduce the on-Site volume and mobility through excavation and off-Site disposal/treatment but not the toxicity of Site surface soils. Alternative S3 and S4 would provide a greater degree of TMV than S2 and would fully address the health risks posed by the principle threat wastes in Area E. Alternative S3 would reduce the toxicity of the highly contaminated subsurface soils through solidification/stabilization. Alternative S4 would reduce the TMV of subsurface soils through electrochemical treatment.

Short-Term Effectiveness

Alternative S1 would have the fewest short-term impacts and the least amount of intrusive construction activities and would not require MERECO or adjacent businesses to suspend or relocate operations. Alternatives S2, S3 and S4 would have more short-term impacts than S1 due to the removal of contaminated surface soils at the MERECO Property and its adjoining properties. Alternatives S3 and S4 would have somewhat greater short-term impacts than alternative S2 due to the temporary risk and disturbance created by treatment activities at the MERECO Property and its adjoining properties which would require MERECO to suspend or relocate operations during construction and which would utilize a portion of an adjacent property for a staging area. Alternative S3 and S4 would also have more short-term impacts than Alternative S2 on on-Site construction workers due to additional construction activities and a longer period of project duration, about one year for Alternative S3 and about three years for Alternative S4. However, these short-term impacts can be readily addressed through a combination of air monitoring, engineering controls (including the use of dust suppressants, if necessary), along with the appropriate use of personnel protective equipment. Such measures would be used to minimize the short-term impacts of S2, S3 and S4 and would protect the local community and the public.

Implementability

6 - TCLP refers to the Toxicity Characteristic Leachate Procedure under RCRA which measures the leachability and mobility of certain toxic contaminants such as mercury from the soil into the groundwater.

Alternative S1 would be easiest to implement both technically and administratively. Alternative S2 would be the second easiest to implement. Alternatives S3 and S4 would be more difficult to implement than Alternative S2 based upon the additional construction activities required. Alternative S3 is considered more technically implementable than Alternative S4, since solidification/ stabilization has been more widely used and is more commercially available. Alternative S4 involves the use of an innovative technology that is only available through a limited number of vendors and has not been demonstrated on a full-scale basis for mercury in the United States. However, a recently completed bench-scale test of electrokinetics indicated that it could likely be effective in removing mercury from the Site soils.

Cost

The estimated capital, annual operation and maintenance (O&M), which includes monitoring, and present-worth costs for each of the soils/groundwater remediation alternatives are presented below. All present worth costs were calculated using a discount rate of 7 percent.

Alternative	Capital Cost	Annual O&M	Present Worth
S-1	$0	$0	$69,120
S-2	$2,871,891	$96,000	$4,136,858
S-3	$9,206,521	$82,000	$10,297,587
S-4	$20,831,978	$82,000	$21,923,045

State Acceptance

NYSDEC concurs with the selected remedy for soils and groundwater.

Community Acceptance

Community acceptance of the selected remedy for soils and groundwater (Cap Maintenance, Groundwater Monitoring, In-Situ Solidification/Stabilization, Limited Soil Excavation and Institutional Controls) was assessed during the public comment period. EPA believes that the community generally supports this approach. Specific responses to public comments are addressed in the Responsiveness Summary (Appendix V). EPA received comments from a few of the potentially responsible parties (PRPs) for the Site. The PRPs generally preferred Alternative S2 over Alternative S3. EPA considered these and other similar comments from the PRPs and EPA's response to these comments is in the Responsiveness Summary. For the reasons set forth below under Selected Remedy, EPA has concluded that Alternative S3 is the correct remedy.

A comparative analysis of sediments alternatives, based upon the evaluation criteria noted above, follows.

Overall Protection of Human Health and the Environment

Alternative SD1 would not be protective of the biota, since sediments exceeding the mercury cleanup goal would remain in place. Alternative SD2 would be protective of the biota because contaminated sediments above the cleanup level for sediments would be removed. There is currently no risk to human health due to contaminated sediments.

Compliance with ARARs

While there are currently no federal or New York State promulgated standards for contaminated sediments, there are TBCs, one of which is the New York State's Technical Guidance for Screening Contaminated Sediment, 1994. The sediments cleanup level contained in NYSDEC's guidance is based on values in published literature (Long, E.R., and L.G. Morgan, 1990 - the Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National States and Trends Program and the National Oceanic Atmospheric Administration (NOAA) Technical Memorandum, No.5, OMA52, NOAA National Ocean Service, Seattle, Washington.). The sediments cleanup level of 1.3 ppm for mercury represents the Effects Range-Median or the concentration midway in the range of values associated with biological effects.

Long-Term Effectiveness and Permanence

Alternative SD1 would not be effective or permanent, since no remedial action would be implemented. Alternative SD2 would be effective and permanent since contaminated sediments would be removed.

Reduction in Toxicity, Mobility or Volume through Treatment

Neither Alternatives SD1 nor SD2 would reduce the toxicity of contaminated sediments since neither alternative involves treatment. Alternative SD2 would reduce potential mobility and volume of contaminated sediments at the Site via the relocation of the contaminated sediments to a landfill. Alternative SD1 would have no effect on mobility or volume**.**

Short-Term Effectiveness

Alternative SD1 would have no short-term impacts, since no action would be implemented. In consideration of the limited temporary increase in potential impacts to construction workers, human health and the environment during implementation, Alternative SD2 would have moderate short-term impacts in comparison to Alternative SD1. Both alternatives would have minimal impact to nearby residents, because the Site is located in an industrial area.

Implementability

Alternative SD1 would be easiest to implement, technically and administratively. Alternative SD2 would be more difficult to implement technically, however it involves common technologies and readily available equipment.

Cost

The follow table compares the alternatives for the sediments. All present worth costs were calculated using a discount rate of 7 percent.

Alternative	Capital Cost	Annual O&M	Present Worth
SD-1	$0	$0	$69,120
SD-2	$360,000	$64,000	$780,000

State Acceptance

NYSDEC concurs with the selected remedy alternative for sediments.

Community Acceptance

Community acceptance of the selected remedy for sediments (Contaminated Sediments Removal and Disposal) was assessed during the public comment period. EPA believes that the community generally supports this approach. Specific responses to public comments are addressed in the Responsiveness Summary (Appendix V).

SELECTED REMEDY

Summary of the Rationale for the Selected Remedy

Based upon an evaluation of the alternatives and consideration of community acceptance, EPA has selected Alternative S-3 (Cap Maintenance, Groundwater Monitoring, In-Situ Solidification/Stabilization, Limited Soil Excavation and Institutional Controls) and Alternative SD-2 (Contaminated Sediments Removal and Disposal**)** as the remedy for the Mercury Refining Superfund Site.

The selected remedy will provide the best balance of tradeoffs among the alternatives with respect to the evaluating criteria, as described below.

Applying the NCP's nine criteria and given the anticipated future land use of the Site, Alternative S3 will provide the most cost-effective solution for addressing Site risks including the principle threat wastes. Excavation of soils exceeding the soil cleanup level and

solidification/stabilization of soils which contain groundwater which exceeds the cleanup level for groundwater is consistent with the future industrial land use of the Site. Excavation of the soils will prevent any risk from direct contact. Solidification/stabilization of the deeper soils will prevent risks associated with the contaminated groundwater and will address the principle threat wastes. In addition, the SMP will ensure the proper handling, treatment, and disposal of soils, including but not limited to, soils beneath the Phase 1 and Container Storage Buildings or any other on-Site soils, including soils on the adjoining properties (i.e. Diamond W., Albany Pallet and Allied Building), which may not be remediated by this alternative. The SMP will also address vapor intrusion at the existing and future buildings on-Site and potential demolition and/or alteration of the buildings currently on-Site.

EPA is not selecting a specific groundwater remedy, such as pump and treat, because the solidification/stabilization treatment process will effectively immobilize the existing volume of contaminated groundwater which underlies the Site. In addition, institutional controls will be required to prevent the use of groundwater at the Site until groundwater quality standards are met.

Alternative SD-2 also provides the most cost-effective means, using the nine criteria, of addressing the impact of contaminated sediments on ecological receptors at the MERECO stormwater outfall. A wetlands delineation will also be performed during the remedial design to confirm the extent of the wetland area. Affected wetlands of the Unnamed Tributary will be restored and monitored to ensure that restoration is complete.

Given the above factors, the selected alternatives S-3 and SD-2 provide the best balance of trade-offs among the potential alternatives evaluated with respect to the evaluating criteria. EPA believes that the selected remedy will be protective of human health and the environment, will comply with ARARs, TBCs and other guidance, will be cost-effective, and will utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. SS-2 was not chosen since it does not address the risk due to the mercury in the soils below the existing concrete/asphalt caps, the soils at depth, nor the area of dissolved mercury in the aquifer. S-4 was not chosen since electrochemical treatment is not a technology which has been widely used or proven and would be significantly more expensive to perform. SD-1 is not protective of human health and the environment nor does it comply with ARARs, TBCs and other guidance.

Description of Selected Remedy

Following is a summary of the selected remedy:

- Excavation and off-Site disposal of surface soils and subsurface soils above the water table from the Mercury Refining Property and adjoining properties (*i.e.*, Albany Pallet and Box Company (Albany Pallet), Allied Building Products Corporation (Allied Building) and Diamond W. Products Incorporated (Diamond W.) which exceed the cleanup level for mercury in soil of 5.7 parts per million (ppm) for industrial property usage. These soils also include the soils associated with the

stormwater sewer/catch basin systems. Verification sampling will be performed to confirm the effectiveness of the remedy. Clean soil will be backfilled into the excavated areas.

- Solidification/Stabilization involving mixing or injection of treatment agents at the Mercury Refining and Allied Building properties to immobilize contaminants in surface soils, subsurface soils,[7] and soils below the water table where the groundwater has a dissolved mercury concentration which exceeds the cleanup level of 0.7 parts per billion (ppb) for mercury in groundwater. Pilot testing will be performed before treatment and verification sampling will be performed after treatment to confirm the effectiveness of the remedy in immobilizing contaminated soils and achieving groundwater standards.

- Imposition of institutional controls in the form of environmental easements/restrictive covenants to restrict future development/use of the Site. Specifically, environmental easements/restrictive covenants will be filed in the property records of Albany County. The easements/covenants will at a minimum: (a) limit the Site to industrial uses; (b) preserve the integrity of the existing clay cap on the southern portion of the Mercury Refining Property; (c) preserve the integrity of the solidified/stabilized mass; (d) prevent the excavation of soils which lay beneath the Phase 1 Building, which housed Mercury Refining's operations, and the Container Storage Building, which was used to store incoming mercury bearing material for processing, unless the excavation follows a Site Management Plan (see below); and (e) restrict the use of groundwater as a source of potable or process water until groundwater quality standards are met.

- Development and implementation of an EPA-approved Site Management Plan (SMP). The SMP, will, among other things, address long-term operation and maintenance (O&M) of the Site, and future excavation of soils including, but not limited to, soils beneath the Phase 1 and Container Buildings on the Mercury Refining Property, to insure that the soils are properly tested and handled to protect the health and safety of workers and the nearby community. The approved SMP will also require an evaluation of the potential for vapor intrusion at all existing buildings on-Site and/or those to be constructed in the future, and mitigation, if necessary, in compliance with the SMP. Finally, the SMP will provide for the proper management of all Site remedy components post-construction and shall include: (a) monitoring of groundwater to ensure that, following Site remediation, the contamination has attenuated and the groundwater has been remediated; (b) monitoring and maintenance of institutional controls; (c) a provision for operation and maintenance of the clay cap; (d) periodic certifications by the owners/operators of the Site properties or other party implementing the remedy that the institutional and engineering controls are in place; and (e) a provision to manage the demolition or alteration of the existing buildings on-Site, if such demolition or alteration is proposed in the future, to protect the health

[7] This would include soils beneath the existing asphalt/concrete cap but not soils beneath the Container Storage Building or the existing clay cap.

and safety of the workers and the nearby community and to ensure proper disposal of any building debris.

- Removal, dewatering and disposal of the mercury-contaminated sediments in the Unnamed Tributary exceeding the cleanup level for mercury in sediments of 1.3 ppm.

- Verification sampling will be performed to confirm the effectiveness of the remedy.

- Sampling of the fish, surface water and sediments in the Patroon Creek, the Unnamed Tributary and the I-90 Pond to assess impacts on the biota on an annual basis for five years. Sampling thereafter will be based on the results of the five annual sampling rounds, as reported within the first five-year review. Should conditions change with regard to the I-90 Pond dam (i.e., the dam is repaired, removed, or if it should fail), EPA will evaluate the potential impact of any significant releases and, if necessary, take or require response actions to mitigate their potential impact.

- In accordance with CERCLA and because the remedy will result in contaminants remaining on-Site above levels that will allow for unlimited use and unrestricted exposure, the Site remedy will be reviewed at least once every five years

Summary of Estimated Remedy Costs

The total estimated present worth cost for the selected remedy for the Site includes an estimated $10,300,000 for addressing contaminated soils and groundwater and an estimated $780,000 for removing contaminated sediments from the Site. These estimates include $82,000 per year in operation and maintenance costs for 30 years for the soils and groundwater alternative and $64,000 per year to monitor the impact of the sediments removal for 30 years. The information in these cost estimate summaries are based on the best available information regarding the anticipated scope of the soils and groundwater remediation outlined in Alternative S-3 and the scope of sediments remedy set forth in Alternative SD-2. These are order-of-magnitude engineering cost estimates that are expected to be within +50 to -30 percent of the actual cost of the project. Changes in the cost elements are likely to occur as a result of updated information on the quantities of soils and sediments that require excavation, and particularly on the volume of the deeper soils which will be solidified in Area E, and on the hazardous or non-hazardous disposal requirements for the Site soils and sediments. These elements will be refined during the pre-design investigation and remedial design of the components of this alternative. Changes in the cost of the remedy may be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Difference, or a ROD Amendment, depending on the extent of the necessary change.

Expected Outcomes of Selected Remedy

Implementation of the chosen soils/groundwater remedy (Alternative S-3) will eliminate potential risks associated with exposure to contaminated soils and groundwater. Excavation and removal of soils and sediments from the Site which exceeds the cleanup level for soils of

5.7 ppm and the cleanup level for sediments of 1.3 ppm, respectively, and solidification of soils which contains groundwater that exceeds the cleanup level for groundwater of 0.7 ppb will allow for continued industrial use of the Site, will prevent leaching of mercury into the groundwater and address the impact of contaminated sediments on ecological receptors in the Unnamed Tributary to the Patroon Creek. Implementation of a Site Management Plan and institutional controls will ensure continued protection of human health and the environment after the removal and solidification aspects of the remedy are completed. Construction of the remedy is expected to take approximately 1 year. This does not include the time required to negotiate with potentially responsible parties, design the remedy, procure contracts for design and construction, or put institutional controls in place.

The cleanup levels, summarized on pages 25 and 26, are based on ARARs, TBC, guidance values, or risk-based values (e.g., EPA and/or NYSDEC standards and guidance).

STATUTORY DETERMINATIONS

Under CERCLA Section 121, 42 U.S.C. §9621, and the NCP, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete the selected remedial action for this Site must comply with applicable, or relevant and appropriate environmental standards established under Federal and State environmental laws unless a waiver from such standards is justified. The selected remedy also must be cost effective and utilize permanent solutions and alternative treatment technologies or resource-recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous substances. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy is protective of human health and the environment. Alternatives S-3 and SD-2 are protective of human health because they will eliminate human exposure to contaminated soils, groundwater and sediments that could be encountered based on reasonably anticipated future land use. Alternative S-2 also employs institutional controls and provides a Site Management Plan to protect human health and the environment from contaminated soils left in place. Alternative SD-2 is protective of the environment because it will eliminate ecological receptor exposure to contaminated sediments likely to be encountered in the Unnamed Tributary to the Patroon Creek.

Compliance with ARARs and TBCs

EPA has selected a cleanup level of 5.7 ppm of mercury for soils on industrial use property based on New York State's Soil Cleanup Objectives at 6 NYCRR Part 375. The ARAR for groundwater is based on the NYSWQS, which is a chemical specific ARAR for groundwater

in the saturated soils. The cleanup level for groundwater is also being used to target deeper soils at the Site which are below the water table. The cleanup level for sediments was selected from the NYSDEC's Technical Guidance for Screening Contaminated Sediment, 1994

Alternative S-3 will achieve the cleanup levels for soils and groundwater Site-wide; Alternative SD-2 will achieve the cleanup level for sediments at the MERECO stormwater outfall in the Unnamed Tributary.

The remedy will comply with the following ARARs, Other Criteria, Advisories, or Guidances identified for the Site and will be demonstrated through monitoring, as appropriate.

Chemical-Specific ARARs, TBCs and other Guidance	
Federal	**New York State**
<u>Drinking Water Standards and Regulations</u> National Primary Drinking Water Standards (40 CFR Part 141). The drinking water standards (maximum contaminant levels (MCL))	<u>Groundwater Standards and Guidances</u> • New York State Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations (6 New York Environmental Conservation Rules and Regulations [6 NYCRR] Part 703). The standard for mercury in Class GA groundwater is 0.7 ppb. • New York State Department of Health Drinking Water Standards (10 NYCRR Part 5) sets MCLs for public drinking water supplies. The State MCL for mercury is 2 ppb. <u>Soil Guidelines</u> Remedial Program Soil Cleanup Objectives (6 NYCRR Subpart 375-6, Table 375-6.8(b**)** <u>Sediment Guidelines</u> Technical Guidance for Screening Contaminated Sediments (Revised 1999)

Chemical-Specific ARARs, TBCs and other Guidance	
Federal	**New York State**
Wetlands and Flood plains Standards and Regulations: • Statement on Procedures on Flood plain Management and Wetlands Protection • RCRA Location Standards (40 CFR 264.18) • Flood plain Executive Order (EO 11988) • Wetlands Executive Order (EO 11990) • National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321: 40 CFR 1500 to 1508) • Clean Water Act (CWA) Section 404 (b)(1) Guidelines for Specification of Disposal Sites for Dredge or Fill Material; Section 404 (c) Procedures; 404 Program Definitions; 404 State Program Regulations. Wildlife Habitat Protection Standards and Regulations: • Fish and Wildlife Coordination Act (16 USC § 661) • Fish and Wildlife Conservation Act (16 USC § 2901 • Endangered Species Act (16 USC § 1531) Historic Preservation Standards and Regulations: • National Historic Preservation Act (40 CFR Part 6.301)	Wetlands and Flood plains Standards and Regulations : • New York Wetland Laws (6 NYCRR Part 663 Confirm w/DEC). • New York Freshwater Wetland Permit Requirements and Classification (Articles 663 and 664) • Flood plain Management Regulations - Development Permits (500 ECL Article 36) Wildlife Habitat Protection Standards and Regulations (6 NYCRR): • Endangered and Threatened Species of Fish and Wildlife (Part 182). Resource Management Services Use and Protection of Waters (6 NYCRR Part 608)

Chemical-Specific ARARs, TBCs and other Guidance	
Federal	**New York State**
Federal Standards and Guidelines General - Site Remediation: • Resource Conservation and Recovery Act (RCRA): Identification and Listing of Hazardous Waste (40 CFR 261); Standards Applicable to Generators of Hazardous Waste (40 CFR 262); Standards Applicable to Owners and Operators of Treatment, Storage, and Disposal Facilities (40 CFR 264). • Occupational Safety and Health Administration (OSHA) Worker Protection (29 CFR 1904, 1910, 1926). • 40 CFR 61 National Emission Standards for Hazardous Air Pollutants, Subpart E- National Emission Standard for Mercury. Emissions limits listed in section 61.52 are relevant and appropriate. Transportation and Disposal of Hazardous Waste: • Hazardous Materials Transportation Regulations (49 CFR 107: 171, 172, 177 to 179). • Standards Applicable to Transporters of Hazardous Waste (40 CFR 263, Subpart D). • Land Disposal Restrictions (40 CFR 268). Discharge: • National Pollutant Discharge Elimination System (40 CFR 122, 125) Off-Gas Management: • National Ambient Air Quality Standards (40 CFR 50).	New York Solid and Hazardous Waste Management Regulations (6 NYCRR): • Hazardous Waste Management System - General (Part 370) • Solid Waste Management Regulations (Part 360) • Identification and Listing of Hazardous Waste (Part 371) • Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (Part 372) • Standards for Universal Waste (Part 374-3) • Land Disposal Restrictions (Part 376) Discharge (6 NYCRR): • The New York Pollutant Discharge Elimination System (Part 750-757) • *New York Standards and Specifications for Erosion and Sediment Control*; for structures related to post-construction controls, the *New York State Stormwater Management Design Manual.* Disposal of Hazardous Waste (6 NYCRR): • Waste Transporter Permit Program (Part 364) Off-Gas Management: • New York General Provisions (6 NYCRR Part 211) • New York Air Quality Standards (6 NYCRR Part 257) • New York State Department of Environmental Conservation (DAR-1) Air Guide 1), Guidelines for the Control of Toxic Ambient

Chemical-Specific ARARs, TBCs and other Guidance	
Federal	**New York State**
	Contaminants. • New York State Department of Health Generic Community Air Monitoring Plan • Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites (TAGM #4031)

Cost-Effectiveness

A cost-effective remedy is one whose costs are proportional to its overall effectiveness (NCP §§300.430(f)(1)(i)(B)). Overall, effectiveness is based on the evaluations of long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness. Based on the comparison of overall effectiveness to cost, the selected remedy meets the statutory requirement that Superfund remedies be cost effective (NCP §§300.430(f)(1)(ii)(D)) in that it is the least-cost action which will achieve the cleanup levels within a reasonable time frame. Alternative S-3 is approximately half the cost of Alternative S4 ($10.3 million vs. $ 20.8 million) and is also protective of human health and the environment and will attain ARAR requirements. While Alternative S2 is less costly than the selected remedy, Alternative S-2 would not achieve ARARs for groundwater nor would it permanently address the toxicity associated with the principle threat wastes at the Site.

The selected remedy has undergone a detailed cost analysis. In that analysis, capital costs and O&M costs have been estimated and used to develop present-worth costs. In the present-worth cost analysis, annual costs were calculated for 30 years using a seven percent discount rate (consistent with the FS and Proposed Plan). For a detailed breakdown of costs associated with the selected remedy see Appendix II, Tables 10 and 11.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

EPA has determined that the selected remedy represents the maximum practicable extent to which permanent solutions and treatment technologies can be utilized at the Site and provides the best balance of tradeoffs among the alternatives with respect to the balancing criteria set forth in 40 CFR §300.430(f)(1)(i)(B). The selected remedy is more costly than Alternative 2, however, it will more effectively and permanently address the risk associated with the Principle Threat waste in Area E. The selected remedy also will not remove the mercury contamination from Area E through treatment, which would be accomplished by Alternative 4, but it will use a technology which is more reliable and can reduce the mobility and toxicity

of mercury. The remedy is also less costly, more implementable and is expected to be just as effective as Alternative 4 in the long-term, while being protective of human health and the environment and meeting ARAR requirements.

Preference for Treatment as a Principal Element

The statutory preference for remedies that employ treatment as a principal element is not completely satisfied through the implementation of the selected remedy because only certain soils on-Site will be treated. Principle Threat wastes are found in Area E of the Site which contains highly contaminated soils along with beads of pure elemental mercury. The groundwater and the soils below the water table in Area E will be solidified and stabilized to immobilize the mercury and therefore this portion of the remedy satisfies the statutory preference for treatment. The other contaminated soils at the Site, which will be excavated and disposed of off-Site, will not be treated; however, their removal is protective of human health and the environment, given the anticipated future land use at the Site. Any remaining soils which are not excavated are unlikely to be disturbed given the anticipated future Site use, but in the event that they are, a Site Management Plan will be developed and implemented to ensure their proper handling and treatment. Periodic groundwater monitoring will be performed to confirm that source removal actions have a positive impact on groundwater quality.

Five-Year Review Requirements

Because the selected remedy results in contaminants remaining on-Site above levels that would allow for unlimited use and unrestricted exposure, a review of Site conditions will be conducted no less often than every five years after completion of the construction of the remedy. The Site reviews will include an evaluation of the remedy components to ensure that the remedy remains protective of human health and the environment.

DOCUMENTATION OF SIGNIFICANT CHANGES

There were no significant changes from the preferred remedy presented in the March 2008 Proposed Plan.

APPENDIX I

FIGURES

FIGURE		DESCRIPTION
FIGURE 1	-	Site Map
FIGURE 2	-	Remedy Description
FIGURE 3	-	Groundwater Sampling Locations
FIGURE 4	-	Potential Ecological Exposure Pathways

APPENDIX II

TABLES

TABLE 1

SELECTION OF EXPOSURE PATHWAYS

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/ Future	Sediments	Sediments	Patroon Creek Watershed (Tributary, Creek, I-90 Pond)	Recreational	Adult	Dermal	Off-Site	Quant	Waders may have exposed skin surface in contact with sediments.
			Patroon Creek Watershed (Tributary, Creek, I-90 Pond)	Recreational	Adolescent (12 -18 years)	Ingestion	Off-Site	Quant	Waders may incidentally ingest sediments.
	Surface Water	Surface Water	Patroon Creek Watershed (Tributary, Creek, I-90 Pond)	Recreational	Adult	Dermal	Off-Site	Quant	Waders may have exposed skin surface in contact with surface water.
			Patroon Creek Watershed (Tributary, Creek, I-90 Pond)	Recreational	Adolescent (12 -18 years)	Ingestion	Off-Site	Quant	Waders may incidentally ingest surface water.
	Fish	Fish Tissue	Patroon Creek Watershed (Tributary, Creek, I-90 Pond)	Recreational	Adult	Ingestion	Off-Site	Quant	Recreational users may catch and eat fish from the tributary.
			Patroon Creek Watershed (Tributary, Creek, I-90 Pond)	Recreational	Adolescent (12 -18 years)	Ingestion	Off-Site	Quant	Recreational users may catch and eat fish from the tributary.
			Patroon Creek Watershed (Tributary, Creek, I-90 Pond)	Recreational	Child (0-6 years)	Ingestion	Off-Site	Quant	Children may eat fish caught by recreational users of the tributary.
			Patroon Creek Watershed (Tributary, Creek, I-90 Pond)	Subsistence	Adult	Ingestion	Off-Site	Qual	Potential risks from subsistence fish ingestion will be evaluated qualitatively.
			Patroon Creek	Subsistence	Adolescent (12 -18	Ingestion	Off-Site	Qual	Potential risks from subsistence fish

			Watershed (Tributary, Creek, I-90 Pond)		years)				ingestion will be evaluated qualitatively.
			Patroon Creek Watershed (Tributary, Creek, I-90 Pond)	Subsistence	Child (0-6 years)	Ingestion	Off-Site	Qual	Potential risks from subsistence fish ingestion will be evaluated qualitatively.
	Surface Soil	Surface Soil	ATV Trail	Recreational	Adolescent (12-18 years)	Dermal	Off-Site	Quant	ATV Trail users may have exposed skin surface in contact with soil.
			ATV Trail	Recreational	Adolescent (12-18 years)	Ingestion	Off-Site	Quant	ATV Trail users may incidentally ingest soil.
		Air	ATV Trail	Recreational	Adolescent (12-18 years)	Inhalation	Off-Site	Quant	ATV Trail users may inhale fugitive dust.
	Indoor Air	Indoor Air	MERECO	Worker	Adult	Inhalation	On-Site	Quant	Workers may inhale volatiles that migrate from the subsurface to indoor air.
Future	Surface Soil	Surface Soil	MERECO	Worker	Adult	Dermal	On-Site	Quant	Workers may have exposed skin surface in contact with soil.
			MERECO		Adult	Ingestion	On-Site	Quant	Workers may incidentally ingest soil.
			MERECO	Trespasser	Adolescent (12–18 years)	Dermal	On-Site	Quant	Trespassers may have exposed skin surface in contact with soil.
			MERECO			Ingestion	On-Site	Quant	Trespassers may incidentally ingest soil.
			Bordering MERECO	Worker	Adult	Dermal	On-Site	Quant	Workers may have exposed skin surface in contact with soil.
					Adult	Ingestion	On-Site	Quant	Workers may incidentally ingest soil.
		Outdoor Air	MERECO	Worker	Adult	Inhalation	On-Site	Quant	Workers may inhale fugitive dust.
			MERECO	Trespasser	Adolescent (12-18 years)	Inhalation	On-Site	Quant	Trespassers may inhale fugitive dust.
			Bordering MERECO	Worker	Adult	Inhalation	On-Site	Quant	Workers may inhale fugitive dust.
	Subsurface Soil	Subsurface Soil	MERECO	Construction Worker	Adult	Dermal	On-Site	Quant	Workers may have exposed skin surface in contact with soil.
			MERECO	Construction Worker	Adult	Ingestion	On-Site	Quant	Workers may incidentally ingest soil.
		Outdoor Air	MERECO	Construction Worker	Adult	Inhalation	On-Site	Quant	Workers may inhale volatiles/particulates.
	Groundwater	Groundwater	Tap Water	Resident	Adult	Dermal	Off-Site	Quant	Groundwater is not presently used. Assumes potable use in future.
			Tap Water	Resident	Adult	Ingestion	Off-Site	Quant	Groundwater is not presently used. Assumes potable use in future.
			Tap Water	Resident	Child	Dermal	Off-Site	Quant	Groundwater is not presently used.

									Assumes potable use in future.
			Tap Water	Resident	Child	Ingestion	Off-Site	Quant	Groundwater is not presently used. Assumes potable use in future.
			Vapors in Bathroom	Resident	Adult	Inhalation	Off-Site	Quant	Groundwater is not presently used. Assumes potable use in future.
			Vapors in Bathroom	Resident	Adult	Inhalation	Off-Site	Quant	Groundwater is not presently used. Assumes potable use in future.

Quant = Quantitative risk analysis performed; Qual = Qualitative analysis performed.

Summary of Selection of Exposure Pathways

The table describes the exposure pathways associated with the groundwater that were evaluated for the risk assessment, and the rationale for the inclusion of each pathway. Exposure media, exposure points, and characteristics of receptor populations are included.

TABLE 2

Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Concern	Concentration Detected		Concentration Units	Frequency of Detection	Exposure Point Concentration (EPC)	EPC Units	Statistical Measure
		Min	Max					
Ground- water	Mercury	0.1	22.7	µg/L	7/16	12	µg/L	97.5% Chebyshev

97.5% Chebyshev: 95% Upper Confidence Limit for Nonparametric Data; Chebyshev

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	Chemical of Concern	Concentration Detected		Concentration Units	Frequency of Detection	Exposure Point Concentration (EPC)	EPC Units	Statistical Measure
		Min	Max					
Subsurface Soil	Mercury	0.06	27950	mg/Kg	14/18	17000	mg/Kg	95% Chebyshev

95% Chebyshev: 95% Upper Confidence Limit for Nonparametric Data; Chebyshev

Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

This table presents the chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in soil and groundwater (i.e., the concentration that will be used to estimate the exposure and risk from each COC in soil and groundwater). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC and how it was derived.

TABLE 3

Non-Cancer Toxicity Data Summary

Pathway: Oral/Dermal

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Absorp. Efficiency (Dermal)	Adjusted RfD (Dermal)	Adj. Dermal RfD Units	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfD: Target Organ	Dates of RfD:
Mercury	Chronic	3E-04	mg/kg-day	100%	2.1E-05	mg/kg-day	Immune System	1000	IRIS	11/10/04

Pathway: Inhalation

Chemical of Concern	Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Inhalation RfD	Inhalation RfD Units	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfD: Target Organ	Dates:
Mercury	Chronic	3E-04	mg/m3	8.6e-05	mg/kg-day	CNS	30	IRIS	11/10/04

Key

NA: No information available
IRIS: Integrated Risk Information System, U.S. EPA
CNS: Central Nervous System

Summary of Toxicity Assessment

This table provides non-carcinogenic risk information which is relevant to the contaminants of concern in soil and groundwater. When available, the chronic toxicity data have been used to develop oral reference doses (RfDs) and inhalation reference doses (RfDi).

TABLE 4

Cancer Toxicity Data Summary

Pathway: Oral/Dermal

Chemical of Concern	Oral Cancer Slope Factor	Units	Adjusted Cancer Slope Factor (for Dermal)	Slope Factor Units	Weight of Evidence/ Cancer Guideline Description	Source	Date
Mercury	NA	$(mg/kg/day)^{-1}$	NA	$(mg/kg/day)^{-1}$	C	IRIS	11/10/04

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Slope Factor	Slope Factor Units	Weight of Evidence/ Cancer Guideline Description	Source	Date
Mercury	NA	$(mg/m^3)^{-1}$	NA	$(mg/kg\text{-}day)^{-1}$	D	IRIS	11/10/04

Key:

IRIS: Integrated Risk Information System. U.S. EPA
NA: No information available
that limited human

EPA Weight of Evidence:

A - Human carcinogen
B1 - Probable Human Carcinogen-Indicates data are available
B2 - Probable Human Carcinogen-Indicates sufficient evidence in animals associated with the site and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E- Evidence of noncarcinogenicity

Summary of Toxicity Assessment

This table provides carcinogenic risk information which is relevant to the contaminants of concern in soil and groundwater. Toxicity data are provided for both the oral and inhalation routes of exposure.

TABLE 5

Risk Characterization Summary – Noncarcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child & Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Risk			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground-water	Ground-water	Tap Water	Mercury	Immune	4	200	1	241
							Groundwater Hazard Index Total [1] =	280
							Total Immune System HI =	240

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Risk			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soils	Soils	Soils	Mercury	Immune	70	<1	<1	70
							Soils Hazard Index Total [1] =	70
							Total Immune System HI =	70

The HI Total represents the summed HQs for all chemicals of potential concern at the site, not just those chemicals requiring remedial action which are shown here.

Summary of Risk Characterization - Non-Carcinogens

The table presents hazard quotients (HQs) for each route of exposure and the hazard index (sum of hazard quotients) for all routes of exposure. The Risk Assessment Guidance for Superfund states that, generally, a hazard index (HI) greater than 1 indicates the potential for adverse non-cancer effects.

TABLE 6

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child & Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Tap Water	Mercury	NA	NA	NA	NA
						Total Risk =	NA

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soils	Soils	Soils	Mercury	NA	NA	NA	NA
						Total Risk =	NA

Summary of Risk Characterization - Carcinogens

The table presents cancer risks for each route of exposure and for all routes of exposure combined. As stated in the National Contingency Plan, the acceptable risk range for site-related exposure is 10^{-6} to 10^{-4}. EPA does not quantitatively evaluate mercury as a carcinogen.

APPENDIX III

ADMINISTRATIVE RECORD INDEX

APPENDIX IV

STATE LETTER OF CONCURRENCE

APPENDIX V

RESPONSIVENESS SUMMARY